For CONTENTS, see pages iii and iv of Cover.

pp. 595-656.] [December 15, 1913.

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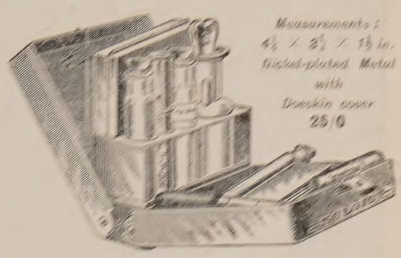

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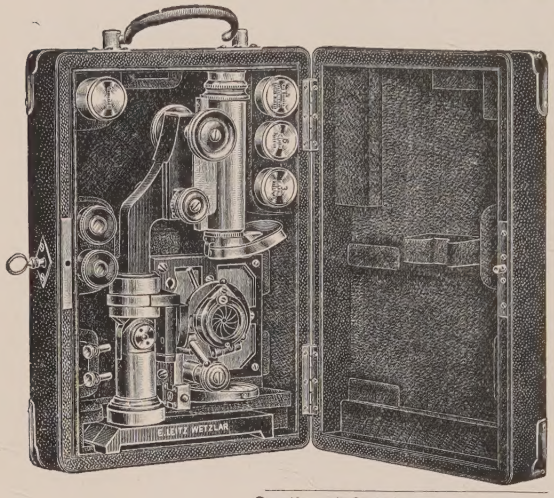

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TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

Vol. 2.] 1913. [No. 12.

BERIBERI.

EIJKMAN (C.). **Aetiologie und Prophylaxis der Beriberi.**—*Trans. xvii. Internat. Congress of Med., London.* 1913. Section xxi. Trop. Med. & Hyg. Part 1. pp. 25-40.

In a long paper opening the discussion on beriberi at the International Congress of Medicine the author mentions that there are two schools of thought as to the causation of beriberi—supporting on the one hand infection, and on the other dietary defects. He describes his experiments on birds and the production of polyneuritis in them, showing that many other foods besides rice may produce the symptoms, and how the neuritis and emaciation are not dependent on one another. In discussing the poison theory, he states that though the hypothesis of a poison in the rice has been disproved, yet the development of a poison in the intestinal tract during metabolism is still admissible. Experiments by feeding different birds and animals have not given constant results and his own were mostly negative.* He thinks curative experiments are of more value than prophylactic ones, and he goes on to show how widely distributed in food the active properties are, though—as was first shown by GRIJNS—superheating is able to destroy them. SCHAUMANN'S nucleo-phosphorus and activator theories are discussed and dismissed. GRIJNS' theory that FUNK'S vitamine is a direct nerve food is, he thinks, a good one, but still is of opinion that the poison theory should not be given up too lightly; it may be a poison that in the last instance affects the nerves, like lead and arsenic—but he does not think that BRADDON'S theory of a fungus in uncured rice is tenable.

The author thinks that the protective principle lies not so much in the "silver husk" as in the gluten layer. The curative effects of other foodstuffs as Katjangidjo beans, maize, etc., are then discussed, as well as the fat and nitrogen starvation theories. That the very considerable decrease in the Japanese Navy was principally due to the introduction of food rich in proteid he thinks

* See FUNK'S reply regarding pigeons and fowls in this number.

(32729—2.) Wt. P 2158—28. 1800. 12/13. D & S.

is very unlikely, as it has been shown by the experiments of FRASER and STANTON and others, that food containing enough proteid for physiological needs will not protect against beriberi if given with polished rice. He states that it is always a perilous proceeding to alter the national food, polished rice is a product of recent culture and does not make for the health of the people eating it—but it must not be thought that a diet of unpolished rice will not cause beriberi, as many instances are recorded among people who live solely on unpolished rice; it is also difficult to explain the time and place distribution of beriberi on dietary grounds. In conclusion the author states that as yet no specific cause has been demonstrated acting either directly, or only when the resistance of the individual has been lowered by dietary defects; neither have specific antibodies, or antigens from various organs been obtained; and with regard to the "partial hunger" theory it must be noted that a diet poor in vitamines does not always cause beriberi, or a diet rich in vitamines necessarily protect against it.

P. W. Bassett-Smith.

NOCHT (B.). **Beriberi.**—*Trans. xvii. Internat. Congress of Med., London.* 1913. Section xxi. Trop. Med. & Hyg. Part 1. pp. 41-44.

The author following EIJKMAN stated that he fully agreed with his historical and critical résumé of the recent experiments on beriberi. He pointed out that GRIJNS was the first definitely to suggest that beriberi was due to the lack of some food constituent and he (Nocht) independently instituted experiments in his laboratory with this view, mainly carried out by SCHAUMANN, who recognised that certain elements, particularly phosphorus, were of importance. He stated his belief that the phosphorus question was by no means worked out, and at present the percentage of phosphorus is the standard used by clinicians in prophylaxis and systematic dietary (as applied particularly to rice-eating people). In 1909 he expressed the opinion that different forms of beriberi were due to the want of certain substances x, y, z. Both SCHAUMANN and FUNK have discovered traces of some of these substances, the action and effect of which is probably indirect and more complicated than was at first supposed. The author pointed out that a general degeneration of the nervous system takes place, as in some infectious diseases, and he thought it should be spoken of as an alimentary nerve degeneration and not as polyneuritis; he thought that the influence of weather, fatigue, and intestinal catarrh were only of secondary importance. In his opinion rice, bran, yeast, and similar stuffs were therapeutically of doubtful value, and raw food material was more reliable than a chemically prepared sterilised and isolated vitamine, because a single such vitamine represents only one of the factors, whilst we need several vitamines, such as are found in raw food and the first extracts of raw food, for prevention and cure.

P. W. B.-S.

CASPARI (W.) & MOSZKOWSKI (M.). **Weiteres zur Beriberifrage.** [Further Enquiries about Beriberi.] — *Berlin. Klin. Wochenschr.* 1913. Aug. 18. Vol. 50. No. 33. pp. 1515-1519.

The authors concluded, as a result of practical experience in New Guinea, that beriberi was a disease of metabolism due to feeding on polished rice. As some authorities consider it as an infection, at the suggestion of SCHILLING an experiment on one of the authors was made in Berlin where all possibilities of infection could be excluded, the patient being fed on a diet consisting largely of polished rice. The patient was under treatment for eight months or 230 days. During the first 138, and last 10 days, a complete record of the metabolism was kept; this was divided into a preparatory period and 11 periods of 8-20 days, the diet being altered slightly at each period, but always with a rice basis. The food was largely vegetable; no meat, cheese, or eggs were given. The result was a clinical picture which the authors and others considered to be undoubtedly beriberi of the cardiac type; there were no motor symptoms, but this they attribute to the experiment not being continued long enough owing to the state of the patient, but they say all doubt was cleared up by the fact that a rapid recovery took place on the administration of an extract of rice bran. [The tables are given in full but it is difficult to follow the conclusions derived from them.] They found that there was an enormous loss of albumen which could only be explained as due to toxic action; the phosphorus balance only varied slightly and had no relation to that of the nitrogen, evidencing that in this form of beriberi the bones were not affected; the muscular power fell with the loss of albumen, and throughout the oxygen consumption was diminished.

Their belief that a toxic agent is present was confirmed by an experiment on pigeons. These were fed for months on hens' eggs with a little salt and grape sugar; the birds increased in weight and enjoyed excellent health. To this food was added a sufficient quantity of polished rice, when all the birds after a longer or shorter period developed polyneuritis—the controls remaining healthy; the diseased birds recovered when given the rice bran extract. This they consider conclusive proof of a toxic origin, and they therefore conclude that beriberi is not caused by a lack of something in the food, but by a harmful addition to it—in other words to a poison. They are quite aware that up to the present no poisonous substance has been extracted from rice grains and they do not maintain that the poison must be already formed in the food, but on the contrary there are many indications that it arises in the organism only after a diet consisting chiefly of disease producing food. They hold strongly that for theoretical reasons the deficiency theory of FUNK is not sufficient, and hope that these experiments have established the toxic etiology of beriberi.

P. W. B.-S.

HOPKINS (F. Gowland). **Diseases due to Deficiencies in Diet.**—*Lancet.* 1913. Nov. 8. pp. 1309-1310.

The author, in his introduction to a discussion in the Section of Therapeutics and Pharmacology of the Royal Society of Medicine, reviews the etiology of the deficiency diseases, among which he places beriberi, rickets, scurvy, Barlow's disease and possibly pellagra. The paper is mainly theoretical and controversial, containing no new facts, but is of much interest. He points out that a deficiency disease may in some cases occur even when the diet contains the substances necessary for perfect metabolism, owing to the imperfect assimilation of these; thus when unpolished rice is used, an occasional case of beriberi may occur. Also from experiment it is evident that the substances called vitamines are of various kinds for different diseases, and minute quantities of them are apparently able to prevent the diseased condition. The author also brings forward some old experiments of his own, showing that young rats receiving a sufficient dietary for health always failed to develop if the food had been purified by extraction with alcohol, and if the substances which had been removed by the alcohol were returned, or if minute quantities of milk or fresh tissue extracts were added, the animals grew normally.

P. W. B.-S.

CHAMBERLAIN (Weston P.). **The Character of the Rice which Prevents Beriberi and the Manner in which it is Milled.**—*Amer. Jl. Trop. Diseases & Prev. Med.* 1913. Aug. Vol. 1. No. 2. pp. 121-128.

It is known that when a fowl subsists exclusively on ordinary commercial rice as sold in the United States, it will become paralysed in about 30 days; the nerve degeneration is undoubtedly due to the absence from the diet of some substance esential to nerve nutrition. If a man is fed on diet consisting of the same kind of rice he will develop beriberi after about 90 days, the pathological symptoms of the two conditions being identical. If a mother eating the same kind of rice gives birth to a child and continues to suckle it, the infant will develop the disease called infantile beriberi. The malady is generally fatal if nursing is continued, but the child recovers if fed on canned or fresh milk. If fowls or babies are given extracts of the pericarp, prevention and cure can be effected. These facts make it important that the tropical practitioner should have some knowledge of rice and its preparation. The author therefore describes the structure of the rice grain, which consists of an endosperm composed almost entirely of starch granules and a thin outer portion, the aleurone layer, which contains the albuminous material with most of the fat; outside this is the inner skin or pericarp. When this is removed, more or less of the aleurone layer comes off with it, leaving little more than a lump of starch. The different methods of milling are described. The highly milled rice is deprived of the essential substance necessary to

prevent beriberi. A very small quantity of this neuritis-preventing substance is necessary to maintain health. Similar substances appear to be present in many articles of diet—egg yolk, peas, beans, yeast, etc. This element is essential for nerve nutrition; it is destroyed by a temperature of 120° C. and by prolonged boiling; therefore a safe undermilled rice may be rendered beriberi-producing if cooked by steam under pressure. The exact chemical nature of the substance has probably not yet been determined; it is not however a phosphorus compound, but is probably an organic base as claimed by FUNK. The ·4 per cent. P_2O_5 index of FRASER and STANTON has been raised by STRONG to ·5 per cent. For practical purposes the author believes that after a little experience the safety of a rice can be readily determined by mere inspection of the grain, either in its natural state or after staining with methylene blue or with Gram's iodine solution.

P. W. B.-S.

ETIOLOGY.

JENNISSEN (J. A. M. J.). **Over Rijstvoeding en Beri-beri onder het Mijnwerkerscorps te Billiton.** [On Rice-diet and Beriberi among the Mine-workers at Billiton.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1913. Vol. 53. No. 4. pp. 570-583.

Some 14,000 Chinamen are employed in the Billiton tin-mines (Dutch East Indies), and for some time past attention has been directed to the connection between the prevalence of beriberi amongst this body of workers and the character of the rice which forms the principal ingredient of their diet.

In the year 1907-8 there was a failure of the rice-crop in the districts of Southern China from which the mine-workers are principally recruited, and as a result it became necessary to import into those districts large quantities of rice from Siam and Rangoon, all of which is polished. As a consequence there was soon after noticed, at the coolie-inspection station at Tandjong-Pandan in Java, a considerable rise in the number of cases of beriberi detected, together with a general impairment of the physique of the recruits. All the cases that could be detected were sent back to China, but in spite of the vigilance exercised a good many sufferers from the disease managed to get smuggled into the mines, and gave considerable trouble to the authorities afterwards.

When the connection between polished rice and beriberi became a matter of general medical knowledge, it was decided to provide that all rice furnished by contract for the feeding of workers in the mines should be unpolished, whilst at the same time the medical inspection of the workers was made more stringent. The result has been, in the last few years, the almost entire suppression of the disease among the corps of workers at Billiton, numbering some 14,000. The few exceptions have been amongst the wood-cutters and other employees who do not draw rice for their rations, but are paid wages and cater for themselves. The rice which

these people buy in the coolie camps is polished Siam and Rangoon rice, and as a consequence they are from time to time brought to hospital suffering from beriberi.

Analysis shows that the difference in content in P_2O_5 between polished and unpolished rice is very considerable. A sample of unpolished rice furnished to the mine gave by the usual analytical methods 0·89 per cent. of ash, and 0·54 per cent. of P_2O_5, while a sample of polished Siam rice bought in the Chinese camp gave only 0·45 per cent. of ash and 0·29 of P_2O_5. The two samples were then submitted to the process of cooking by a camp-cook, and it was found that with the unpolished rice the reduction of P_2O_5 was only from 0·54 to 0·44 per cent., reckoned on the dry grain, while with the Siam rice the reduction was from 0·29 to 0·12 per cent., or a great deal more. Pigeons fed on the cooked unpolished rice remained healthy, whilst pigeons fed on the uncooked Siam rice exhibited very shortly the characteristic signs of paralysis.

The storing of rice, even before polishing, for periods of two to three months also seems to affect unfavourably the content in P_2O_5, in the climate of Java, owing to the sprouting of the germ; but on this point further investigations are in hand.

P. W. B.-S.

HEISER (Victor G.). **Further Experiences with Beriberi in the Philippine Islands.**—*Amer. Jl. Trop. Diseases & Prev. Med.* 1913. Aug. Vol. 1. No. 2. pp. 119-120.

In support of the hypothesis that beriberi in man is intimately associated with the consumption of decorticated or polished rice as a staple article of diet some very interesting facts are given relating to the Culion Leper Colony. Before the use of unpolished rice was begun the deaths among less than 2,000 persons were about 100 per month, the large majority being due to beriberi. After the unpolished rice was introduced the mortality fell to 15-20 per month and there were no further deaths from beriberi. During the autumn of 1911 there was a great shortage of rice, and the price went up so that large issues of polished rice were supplied. In January 1912 beriberi again became prevalent and the mortality rate soon reached 86 per month. In February the use of unpolished rice was resumed and there was an immediate reduction in the number of new cases, and after April the disease entirely disappeared. The author states that after an absence of two years the disease again made its appearance when polished rice was supplied, and that the issue of rice with a ·4 per cent. of P_2O_5 stopped the disease, which reappeared with the issue of a rice with ·2 per cent. of P_2O_5. The author believes that the percentage of P_2O_5 is an excellent index of the value of the rice as a food, but that the identity of the substance in the rice polishings which prevents beriberi has not yet been satisfactorily determined.

P. W. B.-S.

FRASER (H.) & STANTON (A. T.). **The Etiology of Beriberi.** [Memoranda.]—*Brit. Med. Jl.* 1913. Oct. 25. p. 1091.

Reference is made to the memoranda of FENTON (E. G.), LINDSEY, and LAIDLAW (see this *Bulletin*, Vol. 2, p. 292), who drew attention to the possibility of other factors than rice being concerned in the causation of beriberi. The authors point out that, though it is certain that in the Far East rice is the cause of the disease as shown by actual practice, in other countries probably many other diseases are described as beriberi which are very different and have other etiological characters, and it is not likely that any single factor will explain their causation. They deplore the tendency of most writers to exalt the importance of Polyneuritis gallinarum and to ignore the human disease.

P. W. B.-S.

FRASER (H.). **Report from the Institute for Medical Research [Kuala Lumpur, Federated Malay States] for the period October 1st, 1912, to March 31st, 1913.**—Received in Colonial Office June 30, 1913.

In this report it is noted that information has been received from Dr. WOLLASTON and Mr. KLOSS who were exploring in New Guinea, that in the last expedition, of over seven months duration, the 240 coolies employed had remained quite free from beriberi; this they attribute to the fact that they were supplied with unpolished rice only—as on previous expeditions when polished rice was used the men were decimated by the disease.

P. W. B.-S.

GIMLETTE (John D.). **Beriberi in Kelantan. An Appendix to the Annual Report, Malay States, for 1912.**—Received in Colonial Office, Sept. 27, 1913.

The intermittent presence and absence of beriberi in the Malay State of Kelantan are shown in a series of statistics, and appear to be definitely dependent upon the consumption of polished or unpolished rice. According to the author the disease is particularly frequent when the rice used has been stored a long time and has become mouldy. He states that in Kelantan the rice spoils within three or four days if it is allowed to get damp and is neglected; for this reason the Malays do not store their rice but prefer to pound their paddy in small quantities at a time, thus having it always dry and clean for use. In conclusion he considers, from a review of the history of beriberi in Kelantan during the last ten years, that rice only acts as a vehicle of infection among human beings and not as a causative agent.

P. W. B.-S.

STANLEY (A.). **The Etiology of Beriberi.** [Memoranda.]—*Brit. Med. Jl.* 1913. Nov. 1. p. 1160.

The author, who has had over fifteen years' experience at Shanghai and other parts of China, draws attention to the fact that in gaols, convents and schools, where large numbers live together, the number of beriberi cases is greater than in the surrounding general population, there being practically no difference in the rice used. He states that isolation of the sick and ordinary disinfection of clothing, &c., have little or no effect on an outbreak of beriberi, whereas after destruction of all body vermin and bugs, &c., there are strong reasons for thinking that the prevention of the spread of the disease is immediate and effective, which points to infection by external animal parasites.

[No definite facts are given in proof of this infective theory].

P. W. B.-S.

CASEY (J. P.). **The Etiology of Beriberi.** [Memoranda.]—*Brit. Med. Jl.* 1913. Oct. 25. p. 1091.

The author describes shortly an outbreak of beriberi which affected 60 per cent. of the Boer prisoners at the war camp at Deadwood, St. Helena in 1901-2. It was discovered that the land on which the prisoners' tents were pitched had in 1832 been a camping ground for Indian coolies and negroes, and it is suggested that the infection had come from the ground, the micro-organism having been dormant there all these years. When the old ground was condemned and the camp moved there was a marked improvement in the general health, practically all the cases recovering. No case of beriberi occurred among the troops, some of whom were quartered not far from the original prisoners of war camp.

[In the absence of any details of the hygenic and food conditions of the camps and with the very long period of supposed latent infection, the suggestion does not appear to be of much value].

P. W. B.-S.

VITAMINES.

VEDDER (E. B.) & WILLIAMS (R. R.). **Concerning the Beriberi-Preventing Substances or Vitamines contained in Rice Polishings. A Sixth Contribution to the Etiology of Beriberi.**—*Philippine Jl. of Science.* Sec. B., Trop. Med. 1913. June. Vol. 8. No. 3. pp. 175-195.

The authors report a large number of further experiments to determine the composition, preparation and methods for isolating the protective substances against beriberi from rice polishings, and to obtain evidence as to whether there was experimental proof to support BRADDOCK's statement that beriberi only occurred where rice used for food had been stored in a damp place, and that when care was taken to store the rice in a dry place, there was

no beriberi. After an initial series in which fowls were used, three human cases were treated, and as a natural result of the great success obtained by the treatment of cases of infantile beriberi with the extract prepared in the Philippines, this was employed on adults. The results of their work are summarised in the "conclusions," which are here given in full.

"1. Undermilled rice may be stored for one year in a damp place without losing its protective powers against polyneuritis gallinarum. It is improbable therefore that a rice which originally affords protection against beriberi will lose this property by storage even in damp places."

"2. The neuritis-preventing substances or vitamines contained in rice polishings are only slightly soluble in cold 95 per cent. alcohol, since three successive extractions, using a total of 6 liters of alcohol to each kilogram of polishings, fail to remove all of the neuritis-preventing substances from rice polishings.

"3. Strongly alkaline reagents, such as sodium hydroxide, ammonia, and barium hydroxide, destroy the neuritis-preventing vitamine in its free or unhydrolyzed state, and the use of these reagents must be avoided in endeavouring to isolate this substance.

"4. Basic lead acetate does not precipitate the neuritis-preventing vitamine, and a considerable portion of this substance may be recovered from the filtrate.

"5. The therapeutic properties of an alcoholic extract of rice polishings are greatly altered by hydrolysis (treatment with 5 per cent. hydrochloric or sulphuric acid). The unhydrolyzed extract is not poisonous and is only slowly curative. The hydrolyzed extract is exceedingly poisonous in large doses and promptly curative in small doses.

"6. We have confirmed Funk's observations by isolating a crystalline base from an extract of rice polishings by Funk's method. This base in doses of 30 milligrams promptly cured fowls suffering from polyneuritis gallinarum.

"7. Funk's base or vitamine is present in rice polishings in considerable amounts, and only a very small portion of it can be obtained by Funk's method.

"(1) Because the polishings themselves are incompletely extracted.

"(2) The greater part of this base is lost during the chemical manipulations required by Funk's method as shown by the facts:

"(*a*) The curative action of this base, isolated, is from twenty-five to fifty times weaker than the curative action of the original hydrolyzed extract.

"(*b*) When fowls are fed on polished rice and given a daily dose of this base in amounts corresponding to 10 cubic centimeters of the original extract, these fowls are not protected. Ten cubic centimeters of the original extract or 10 grams of polishings daily are amply sufficient fully to protect fowls.

"(3) Because Funk's method depends upon the use of barium hydroxide, and we have shown that this reagent destroys this base.

"8. Two groups of substances (purine bases, choline-like bases) may be isolated from rice polishings in addition to Funk's base and are capable of partly or wholly protecting fowls fed on polished rice against polyneuritis gallinarum, but are incapable of curing fowls that have already developed the disease. The chemical nature of these two groups of bases requires further investigation.

"9. We have confirmed the observation of Suzuki, Shimamura, and Odake, that Funk's base may be precipitated from unhydrolyzed extract by tannic acid, but did not succeed in obtaining large amounts of this substance by this method.

"10. It is probable that this base or vitamine exists in food as a pyrimidine base combined as a constituent of nucleic acid, but that it is not present in the nucleins or nucleic acids that have been isolated by processes involving the use of alkalies or heat.

"11. The administration of unhydrolyzed extract of rice polishings to cases of adult wet beriberi, or to cases suffering from acute cardiac insufficiency, results in the prompt dissipation of oedema and relief of the cardiac symptoms.

"12. The administration of unhydrolyzed extract of rice polishings to cases of dry beriberi is followed by little or no improvement in the paralytic symptoms.

"13. The administration of FUNK's base to cases of dry beriberi is followed by an immediate improvement in the paralytic symptoms. This should remove the last doubt that dry beriberi is caused by the deficiency of this substance in the diet. It also finally proves that dry beriberi of man and polyneuritis gallinarum are essentially the same disease.

"14. We have succeeded in curing a case of infantile beriberi (of the wet type) by administering that portion of the extract of rice polishings represented by the filtrate from the phosphotungstic precipitate. Since this filtrate does not contain FUNK's base, this is evidence that wet beriberi is cured by some other substance.

"15. Conclusions 11, 12, 13, and 14 are striking confirmatory evidence for the hypothesis previously stated by VEDDER and CLARK that wet beriberi and dry beriberi are two distinct conditions, each being caused by the deficiency of a separate vitamine."

[Clinically many authorities do not recognise any distinction between wet and dry beriberi—the one may rapidly pass into the other.]

P. W. B.-S.

FUNK (Casimir). **Fortschritte der experimentellen Beriberiforschung in den Jahren 1911-1913.** [Advances in Experimental Beriberi Research in the Years 1911-1913.]—*München. Med. Wochenschr.* 1913. Sept. 9. Vol. 60. No. 36. pp. 1997-1999.

Previous investigations had shown that an active principle was present in ordinary rice which was absent in polished rice. From its high power of resistance to acids the author concluded that the substance or substances must contain nitrogen. He proceeded to try to isolate these by the usual methods for N. compounds, testing every substance obtained by means of pigeons. He found that the active principle was present in the precipitate by silver nitrate and baryta, etc. The yield by this method was too small for much work, so he tried another method deduced by the suggested resemblance of the substances to the pyrimidin bases. He tested a large number of the substances so obtained on pigeons and obtained only partial curative results, which however suggested further enquiry. He concluded that the active substances must belong to a new group which he called vitamines.. These substances contain nitrogen in a combination which has not yet been found in [? animal] nature, and which animals are not in a position to build up and must therefore draw already made from the vegetable kingdom.

SUZUKI and others had meanwhile isolated nicotinic acid for the first time from rice bran, and also vitamine as a picrate; the latter FUNK so far has not been able to verify. MOORE and others have verified the presence of vitamine in yeast, and COOPER in flesh. From his experiments he determined that vitamine is a very unstable body. By using large quantities of the vitamine-fraction he isolated a crystalline substance which was eventually

split up into three chemically pure substances, one of which was nicotinic acid. These individually had little curative effect, but by combining 1 and 3, marked curative results followed; he also found that the earlier precipitates contained the vitamines. He discovered that there was a loss of activity in the pure substances as compared with the extracts; this was accompanied by a loss of a colour reaction to certain reagents as described by FOLIN and MACALLUM. This colour reaction is only produced by the uric acid group, tyrosin, and some phenols, in addition to certain purin derivatives. All food substances which contain vitamines have so far without exception given these reactions, as well as all vitamine fractions. The method for isolation of these unstable compounds without decomposition has at last been discovered and will be communicated shortly.

The author states that we are still in the dark as to the real nature of beriberi, but he still holds the view that the primary cause is the lack of vitamine in the food, and that it is probable that the nerve degeneration is produced in another as yet unknown manner. The extraordinary rapid action of vitamine can hardly be regarded as that of an anti-toxin and it is certain that the nerve degeneration is secondary, as after cure it is still demonstrable histologically, while functionally the nerve action is normal. He classes with beriberi as "deficiency diseases" scurvy, Barlow's disease, and probably pellagra, and rickets. He states that this study has been most valuable in discovering the complex nature of foodstuffs, and the isolation of the active principles in them will increase our knowledge of cell functions. It is now necessary to study the chemistry of the minute constituents of food which demonstrate themselves by their physiological action.

In a note in reply to EIJKMAN'S statement that the results obtained from the study of pigeons cannot be accepted as true of fowls, he states that during the years of his experimental work no difference has been found in the behaviour of fowls and pigeons, either in the inception of the disease or its cure; also that the statement of BARSICKOW that cerolin (alcoholic extract of yeast) has no action on beriberi pigeons has been proved to be wrong.

P. W. B.-S.

FUNK (Casimir). **Über die physiologische Bedeutung gewisser bisher unbekannter Nahrungsbestandteile, der Vitamine.** [The Physiological Meaning of Certain Hitherto Unknown Food Ingredients, the Vitamines.]—*Ergebnisse der Physiologie.* 1913. Vol. 13. pp. 126-205 and 547-548. With 6 text-figs. and 1 plate.

In this monograph the author has elaborated his own views with reference to beriberi, together with those of others put forward in many important papers recently published. He not only discusses the food question as bearing on beriberi, but also shows how other groups of diseases such as scurvy, rickets, and

pellagra are dependent upon a deficiency in the supply of food containing certain necessary constituents. Most of the points have been put forward previously, and at the end of each section an excellent bibliography is given. After a short introduction, a description of beriberi and polyneuritis of fowls is given, illustrated by the well known examples of paralysed birds and sections of rice grains taken from FRASER and STANTON'S work. He goes on to discuss the chemical nature of the curative substance called by him vitamine, obtained from rice bran, yeast, and other fresh food substances, its chemical composition and physiological action. The proportional activities of different food substances due to the presence of the anti-neuritic substance are also described (egg yolk and yeast having the highest values). The form in which vitamine is present in nature is mentioned and six pages are devoted to an attempt to explain the nature of beriberi. A table is given of the composition and value of the various purin, pyrimidin, and nuclein derivatives, with their allied forms of allantoin and hydrantoin. The purins have practically no curative action, the pyrimidins more, while that of allantoin and hydrantoin is very marked. He finds that those substances were the most active which in composition most nearly resemble vitamine, and had a nuclein basis; finally that the vitamine fraction from yeast is made up of three substances, one with the formula of $C_{24}H_{19}O_9N_5$, another with that of $C_{29}H_{23}O_9N_5$, and nicotinic acid. The first with the third, in doses of 1 m.g. injected subcutaneously produced a cure in affected pigeons. From the vitamine fraction of rice bran two substances have been isolated, $C_{26}H_{20}O_9N_4$ and nicotinic acid. All the derivatives that are obtained from the mother substance are important, but the nicotinic acid is the most active. Ship beriberi is placed with the scurvy group, which differs from tropical beriberi in that the neuritic symptoms are less marked and recovery is more rapid when fresh provisions are supplied. In conclusion he states that these facts open up a new sphere for clinical and physiological research, and that the principles of dietetics must undergo revision and reform. New questions arise as to the composition and preparation of our food, but it is of the utmost importance first to know the relative vitamine content of the various food stuffs.

[Those interested in the subject should read the paper in its original form.]

P. W. B.-S.

WISE (K. S.) & MINETT (E. P.). **Epidemic Dropsy.**—*Report of Tropical Disease Research in the Government Bacteriological Laboratory, British Guiana, for Six Months Oct.*, 1912, *to March*, 1913. Report received in Colonial Office, Sept. 30, 1913.

In 1912 an expedition of 190 creole mulattoes and black men started from Georgetown for a camp up the Essequibo River, 30 miles from the Brazilian border. The situation of the camp

appears to have been well chosen and healthy; no cases of sickness appeared until four months after arrival, when an epidemic broke out, characterised by pyrexia, general progressive oedema and vomiting. The cases occurred over a period of two months. Out of the 190 men 24 were attacked, 7 of whom died. There was no history of an abnormal number of biting insects, and the food though monotonous appears to have been good, the general labourers having brown creole rice (unpolished) with flour, tinned beef, and tinned fish, etc. The symptoms were those of epidemic dropsy though it is noted that on their return to Georgetown the patients showed signs of oedema and cardiac distress on exertion, and a small amount of albumin was present in the urine of two cases; knee-jerks were present and the men appeared otherwise well. The authors consider the disease as one of mal-nutrition coming under the heading of deficiency diseases as described by Funk. A similar outbreak occurred during the construction of the Madeira-Mamore railway in the state of Amazonas and Matto Grosso, Brazil, described by Lovelace as beriberi. (See below and this *Bulletin*, Vol. 1, p. 484.)

P. W. B.-S.

Lovelace (C.). **Peripheral Neuritis in the Amazon Valley.**—*Texas State Jl. of Med.* 1913. July. Vol. 9. No. 3. pp. 94-95.

In the *Journal of the American Medical Association*, 1912, December 14, the author described the results of his observations on 963 cases of a beriberi-like disease which was present in the Amazon Valley (see this *Bulletin*, Vol. 1, p. 484). In this paper he again discusses the etiology of this disease, and concludes that though beriberi in the east is due to a deficiency condition of the food, in this instance defective diet and consumption of rice could be positively excluded. He considers that it is highly probable that the term beriberi is one that has been used to cover a group of diseases, more or less indistinguishable clinically, and that the question of the etiology of beriberi cannot yet be regarded as settled. [No new facts are given.]

P. W. B.-S.

Kariya & Tsujuki. **The Blood Pressure of Beri-beri Patients.**—*Sei-I-Kwai Med. Jl.* 1913. Aug. 10. Vol. 32. No. 8. pp. 109-110. [The original in No. 10, Vol. 27, 1913, of *Jl. Tokyo Med. Assoc.*]

The authors from a study of 28 cases of beriberi, free from kidney complications, etc., found that the maximum blood pressure of the radial artery was less than that of healthy people. This change is most marked in the cardiac and severe types of beriberi, and the blood pressure was inversely proportional to the state of the disease. It is therefore of use in diagnosis and for prognosis.

P. W. B.-S.

Polyneuritis of Birds.

Wellman (C.) & Bass (C. C.). **Polyneuritis Gallinarum caused by Different Foodstuffs. With Special Reference to the Effect of Commercial Rice Coating on Neuritis Production.**—*Amer. Jl. Trop. Diseases & Prev. Med.* 1913. Aug. Vol. 1. No. 2. pp. 129-139. With 3 plates.

Certain experiments are described carried out to determine what common articles of diet besides rice would give rise to polyneuritis in fowls when used as the only food, and whether the commercial samples of polished rice coated with glucose and talc, locally milled, would also produce the disease in fowls. The process of thus preparing the grain is described; the coating gives the rice a highly polished appearance, and makes it keep better, but the amount of glucose and talc varies greatly in different samples—the average amount of glucose equals about one part by weight in eight hundred parts of the finished article; the quantity of the talc is about half this. The following conclusions are given:—

"1. Glucose and talc, when fed together or separately, do not produce *Polyneuritis gallinarum* in birds receiving a diet which does not itself produce the disease.

"2. Glucose and talc in large amounts do not prevent prompt recovery from *Polyneuritis gallinarum.*

"3. *Polyneuritis gallinarum* can be produced by feeding milled rice and many other food substances which have neither glucose nor talc on them.

"4. Glucose and talc, therefore play no part in the production of *Polyneuritis gallinarum* which results from an exclusive diet of 'polished' rice.

"5. These experiments indicate that legislation or regulations against the sale of 'polished' rice, based upon the fact that *Polyneuritis gallinarum* results from feeding it as an exclusive diet, are not warranted.

"6. The evidence here presented indicates that several other common articles of diet produce *Polyneuritis gallinarum* as certainly as does rice, either 'polished' or unpolished; in three instances these other foods produced the disease in quicker time than did rice.

"7. There is, therefore, more argument against the sale of these common articles of diet, sago, Irish potatoes and corn starch, than there is against the sale of rice, 'polished' or 'unpolished,' milled or undermilled."

P. W. B.-S.

Wellman (C.). **On the Production of a Beriberiform Polyneuritis in Fowls with Substances other than Rice.**—*Southern Med. Jl.* 1913. Aug. Vol. 6. No. 8. pp. 516-518. With 9 text-figs.

This short paper was apparently written to point out again that polyneuritis of fowls is not alone produced by the use of polished rice, but can be brought about by feeding on other carbo-hydrates, as cane sugar and corn starch. The author also found that a mixed diet with small doses of oxalic acid produced a similar paralytic condition, as shown in the birds depicted in the illustrations. It is possible that the excessive use of cassava starch in Brazil, and the inordinate drinking of cane juice by the negroes in the Antilles, may have something to do with the outbreaks of beriberi which are reported from these countries.

P. W. B.-S.

VOEGTLIN (C.) & TOWLES (C.). **The Treatment of Experimental Beriberi with Extracts of Spinal Cord.** — *Jl. of Pharmacology & Experim. Therapeutics.* 1913. Sept. Vol. 5. No. 1. pp. 67-76.

After giving a resumé of recent experiments on the curative substances obtained from rice, bran etc., the authors describe their results of feeding 13 pigeons with polished rice and water, which are in agreement with those of previous observers. They then prepared a watery extract of the spinal cord of the ox so that one cc. of this corresponded to four grams of dry cord. 15 pigeons were fed upon polished rice and were treated with this extract, 12 pigeons were also treated with yeast and nucleic acid. As a result of these experiments they came to the following conclusions.—That a long course of observations on fowls suffering from polyneuritis is necessary if positive conclusions are to be reached as to the curative effect of any measure, and many birds must be experimented with. The administration of yeast, nucleic acid and thymine have no effect on the course of experimental beriberi, showing that the anti-neuritic base of FUNK is hardly a derivative of nucleic acid. The aqueous extract of autolysed spinal cord contains an anti-neuritic substance which cures symptoms of polyneuritis in rice-fed birds in daily doses equal to four grams of dried cord, but it cannot restore metabolism nor enable the affected birds to recover their body weight, which bears out the finding of COOPER when using extracts of other foodstuffs. The anti-neuritic substance is present in greater amounts in the nerve fibres than in the nerve cells and is produced by autolysis, for in the fresh cord relatively small amounts only are present.

[Yeast and nucleic acid have been shown by many observers to have a distinct effect on the birds under experiment; therefore the statement in the conclusions given by the authors requires some explanation. COOPER found that half gram doses of dried yeast daily were quite enough to prevent polyneuritis and also to maintain the body weight of birds fed on polished rice (this *Bulletin,* Vol. 1. p. 481).]

P. W. B.-S.

WELLMAN (Creighton), EUSTIS (A. C.), & SCOTT (L. C.). **The Rapid Cure of Polyneuritis Gallinarum by Intramuscular Injection of a Substance isolated from Rice.—Note on the Pathology of the Disease. A Preliminary Report.**—*Amer. Jl. Trop. Diseases & Prev. Med.* 1913. Oct. Vol. 1. No. 4. pp. 295-299.

This is a preliminary report of investigations which are being carried out in the Tulane University laboratories—some of which have previously been reported. Extracts of rice polishings were prepared on the lines laid down by FUNK and these were given intramuscularly to fowls, mostly far advanced in the disease. The number of cures directly traceable to the injections in the first series was small (2 out of 7) but these are stated to have been very convincing. The results of the pathological examination of

the fowls which died of the disease agree generally with those recorded by VEDDER & CLARK, but it is pointed out that possibly the cause of the convulsions, from which the fowls suffered, may be spinal irritation brought about by subdural haematomas which were generally present along the cord, together with extravasations of blood over the cerebral lobes.

P. W. B.-S.

YAMAGIWA (K.), KOYANO (T.), MIDORIGAWA (H.), & MOGI (T.). **Experimental Study on the Cause and Nature of Beriberi. Report II.**—*Sei-I-Kwai Med. Jl.* 1913. Aug. 10. Vol. 32. No. 8. p. 110. [The original in No. 12, Vol. 27, 1913, of *Jl. Tokyo Med. Assoc.*]

The authors made experiments on fowls in order to decide whether substances in bran are capable of preventing acid fermentation of rice, and also whether the poison produced by fermentation of rice can be neutralised or destroyed by substances in the bran.

They came to the following conclusions:—

"1. The bran and its ingredients are capable of preventing the acid fermentation of the polished rice.

"2. The bran and its ingredients appear to be incapable of neutralising or destroying the already formed poison of the fermented solution of rice.

"3. There is no difference in time in the recovery of the fowls, which are suffering from the beriberi-like disease caused by the feeding with the polished rice, by treating them with unpolished rice or with unpolished rice + Oryzanin injection. (Oryzanin is a substance isolated from the bran by SHIMOMURA, ODAKE, & SUZUKI as its active principle.)"

P. W. B.-S.

PAPPATACI FEVER.

BELLILE (P.). **Etude sur la Fièvre des Phlébotomes.**—*Arch. de Méd. et Pharm. Navales.* 1913. July. Vol. 100. No. 7. pp. 5-39. With 3 text-figs.

This is an excellent article on sandfly fever, in which is condensed all the most important information relating to the subject; in it also is included the author's own experience of the disease among the personnel of the French Man-of-War, "Amiral-Charner," while it was stationed at Crete during the years 1910-1912. The ships of France, Italy, Russia and England were sending by turn a detachment of marines to guard the international colours on Suda Island. More than half of the men who performed this duty during the summer were attacked with sandfly fever. The conditions were as precise as a laboratory experiment. No one who remained on board the "Amiral-Charner" was seized although there were mosquitoes in abundance in the ship, but there were no sandflies. On Suda Island on the other hand sandflies were numerous but mosquitoes were few. Thirty eight temperature charts are given in which it is seen that the fever lasts usually two or three days, but in one the temperature was not normal until the eighth day. The highest point attained seldom reached 104° F. Nineteen charts of cases which occurred among the crew of the "Conde" are inserted. They are those of the sandfly infection, although at the time the ailment was recorded as ague. The author quotes Fleet-Surgeon KILROY and Surgeon ADSHEAD's experimental work which was carried out at Suda Island, and reproduces the charts which appeared in their paper (see this *Bulletin*, Vol. 2. p. 25). On many occasions he has made cultures and microscopical examinations of the blood, but only with negative results. He notes that Phlebotomus fever differs from dengue in the absence of rashes and of the secondary rise of temperature. The outbreaks of dengue are more sudden and wide-spread. In 1902 a man-of-war stationed at Cochin-China was rendered ineffective by an epidemic of dengue which swept through it. Those who are not conversant with the literature of Phlebotomus fever often confound this infection with ague; the disease passes under this name among the inhabitants of Crete.

After the doors and windows of the guard room on Suda Island had been protected with fine-mesh wire gauze, and the men slept under muslin nets, the incidence of sandfly fever was lessened. Before these measures were taken 14 out of 19 men had been attacked; afterwards 5 cases only occurred among 42 marines.

C. Birt.

Annual Report of the Sanitary Commissioner with the Government of India for 1911.—1913. Calcutta: Superintendent Government Printing, India. [Sandfly fever. pp. 10, 18, 19, and App. pp. xii, xxiv.]

Annual Return of the European Army of India, of the Indian Army and of the Jail Population for the Year 1911.—[Sandfly fever. pp. 9-16, 19-21, 24, 29-39, 41-43, 52-61, 72.]

In the returns of the European officers, men, women and children stationed in India, for the year 1911, 1,457 attacks of sandfly fever

are registered. Among the Indian troops 114 cases only are recorded, but we find that there were 832 admissions for "pyrexia of uncertain origin" from Indian troops quartered in stations where sandfly fever was prevalent in the British regiments. Since 600 of these attacks occurred in the sandfly season, it is probable that they would have been rightly designated sandfly fever in the majority of instances. Sandfly fever was epidemic in the British barracks at Lucknow, but there were no admissions of Indian soldiers recorded under this heading, yet 77 men of the 74th Punjabis were attacked during the sandfly season with a fever lasting three days. At Kila Drosh and Chitral there are annual epidemics of sandfly fever, but 194 cases of febricula which occurred in these stations in 1911 were returned under the heading of "pyrexia of uncertain origin," no sandfly fever being shown. It is clear therefore, that in order to obtain the true incidence of sandfly fever in India we must scrutinize the tables of the seasonal prevalence of "pyrexia of uncertain origin," remembering that sandfly fever prevails during the hot and dry months.

In 1911 the number of admissions for "pyrexia of uncertain origin" among the European troops was 1914; among the Indian 4,066. 1,313 attacks in the British and 2,551 of the Indian occurred during the period April to September. It is probable that sandfly fever was the cause of the majority of these admissions during the hot weather. In the British army there was an outbreak of 133 cases of "pyrexia of uncertain origin" at Rangoon mostly during the dry months, January to May. At Bhamo 53 of our soldiers were attacked in June to September. 250 cases are reported from Lucknow, all except 39 in March to August; the maximum prevalence being in July in which the rainfall was 1·33in. only. Ambala had 92 cases; Ferozepore 26, 20 of which occurred in the hottest months; Lahore 101 admissions, 84 in May to October; Pashawar 161, all except 31 during the hot and dry months, March to August. Multan 55, the epidemic being almost limited to May to July; Seconderabad 43, 23 in May to July; Belgaum 24, in April to July; Poona 67, of which 46 occurred in April to August; Cherat 51, 39 in May to October; Aden 36, 26 in April to August.

In the Indian troops there were epidemics of "pyrexia of uncertain origin" at Mandalay 254 cases, 186 in June to August; in Bhamo 129, all except 33 in July to September; Lucknow 274, 226 in June to November; Lahore 142, 109 in July to November; Rawal Pindi 124; Nowshera 21; Pashawar 31 in May to August; Kohat 49, 38 in June to September; Edwardsbad 56, all but 8 in June and July; Dera Ismail Khan 65 in May to October; Jandola 108 in May to October; Secunderabad 123; Poona 133; Kirkee 130; Malakand 71 June to August; Quetta 147, mostly in May to October; Jask 56 in June to October; Aden 41.

Six thousand would be an approximate estimate of the number of attacks of sandfly fever which occurred in the European and Indian troops during the year 1911. Outbreaks of "pyrexia of uncertain origin" which arose in the rainy season have been excluded from this estimate; such were reported in Calcutta, Bombay and Rangoon; they were probably mosquito-borne, although only 69 cases

of dengue were recorded among the British regiments during the year.

In the British army alone there was a loss of 32,000 days' service on account of "pyrexia of uncertain origin."

[It is probable that in the great majority of cases registered "pyrexia of uncertain origin" the fever arises from a virus conveyed by the mosquito or sandfly, or from infections by the enteric group of micro-organisms. Until the cause of the outbreak has been defined, aims at prevention may be misdirected; it is therefore of economic importance to ascertain the origin in every instance.]

C. B.

i. Loughnan (W. F. M.). **Phlebotomus in Aden.**—*Jl. Roy. Army Med. Corps.* 1913. July. Vol. 21. No. 1. p. 92.

ii. **Phlebotomus Fever and Papataci Flies in Aden.**—*Ibid.* Oct. No. 4. pp. 402-405.

i. A Phlebotomus has been found in Aden, and three cases of sandfly fever were observed between February and May, 1913.

ii. Before it was known that certain short febrile illnesses occurring in the tropics were caused by the sandfly, it was recognised that these cases were distinct from ague, and they were designated "simple continued fever" or "pyrexia of uncertain origin." Even at the present time many attacks of sandfly fever are still included under such headings.

During the years 1907-1912 inclusive there have been recorded among the British troops stationed at Aden 600 admissions for "simple continued fever," or "pyrexia of uncertain origin"; 713 for ague; and 11 only for enteric fever. Seventy eight per cent. of the 600 cases in the first class occurred in the months of May to October when sandflies are most numerous; 40, 167, 135, 74, 63, and 76 are the figures for the months May to October respectively. In two thirds of 476 of these attacks, concerning which information is available, the duration of the pyrexia was 1 to 4 days; in only 25 of the remainder was the temperature raised for 8 to 10 days. In 1912 the 18th Indian Infantry stationed at the Crater, Aden, suffered severely from sandfly fever. June and July were the months of greatest incidence, when 95 out of the total of 108 cases were admitted to hospital. Malarial parasites were absent from the blood of all; only 7 admissions for ague are recorded during the year in this regiment.

The symptoms of sandfly fever at Aden vary considerably as elsewhere. Vomiting and profuse diarrhoea are not infrequent; hyperaemia of the fauces, slow pulse, leucopenia with relative increase in the large mononuclears, and a fall of the temperature by lysis identify this fever with the sandfly infection in other parts of the world.

The Aden sandfly is the *Phlebotomus minutus*, and is present throughout the year, though most abundantly in the months of May to October. In has been captured in inhabited barracks, bungalows and native quarters, and in caves which are the abodes of camel men and sweepers.

Malaria at Aden is usually imported; no anophelines have been found there recently. Other mosquitoes are common. [It is probable that many of the febrile attacks which last five days or more are mosquito-borne, since Aden is nearly exempt from enteric infections.]

C. B.

BIRT (C.). **Phlebotomus Fever and Dengue.**—*Trans. Soc. Trop. Med. & Hyg.* 1913. June. Vol. 6. No. 7. pp. 243-256.

The first part of this interesting paper is devoted to the history and etiology of Phlebotomus fever, special attention being drawn to its world wide distribution, and its great prevalence among naval and military forces. In the second part of the paper the author discusses the etiology of dengue with relation to sandfly fever, yellow fever, and ROGERS' "Seven day fever"; such terms as three day, seven day, and ten day fever are considered very unsatisfactory and often inaccurate, as no fever keeps time so precisely. There are considerable differences in the infectivity of the virus of sandfly fever and dengue. The Phlebotomus is not capable of transmitting sandfly fever virus until six days after feeding on a patient who is in the first day of his illness, whereas dengue has been conveyed by mosquitoes immediately after their meal of dengue blood, but the virus may survive in them for 8-27 days; they must however have taken the blood from the dengue patient from the second to the fifth day of the disease. It is suggested that it would be much better if infections were designated by their transmitting agency, as rat-flea fever, louse fevers etc.—which would bring vividly to the notice of the public these dangerous foes.

The following conclusions are given:—

"Dengue, phlebotomus and yellow fevers are caused by distinct but closely related kinds of virus. A fever lasting several days in which the examination of the blood for parasites, by culture, and by serum tests, is negative; characterised by slow pulse, leucopenia, and relative polynuclear decrease; occurring in a locality where mosquitoes are numerous, should be attributed to a virus carried by these flies, although some of the symptoms significant of dengue or yellow fever may be wanting."

[It must be remembered that bugs, fleas etc. may carry more than one disease; hence this method of nomenclature would cause confusion.]

P. W. Bassett-Smith.

PHLEBOTOMUS AND ITS BIONOMICS.

KING (Harold H.). **On the Bionomics of the Sandflies (*Phlebotomus*) of Tokar, Anglo-Egyptian Sudan.**—*Bull. Entomol. Research.* 1913. May. Vol. 4. Pt. 1. pp. 83-84.

Tokar is situated eighteen miles from Trinkitat on the Red Sea, and 58 miles south east of Suakin. More than 30,000 acres of alluvial soil, which are under water in July and August when the river is in flood, are sown with cotton. On drying, the earth cracks causing fissures several feet deep. This cultivated area is notorious for the plague of sandflies. The author visited the place

in October, 1912, and examined a plot under cotton nearly 2 miles from the nearest wall or building. The sandflies existed in myriads. As many as 15 would escape on turning over a clod of earth. A Phlebotomus larva was found at a depth of about 4 inches in damp earth near a crack.

A wagtail (*Motacilla alba*) feeds on sandflies at dawn before the insects have returned to shelter for the day.

C. B.

HOWLETT (F. M.). i. **The Breeding Places of Phlebotomus.**—*Proceedings of the Third Meeting of the General Malarial Committee held at Madras, Nov.* 18, 19, & 20, 1912. pp. 209-210. (1913. Simla: Government Central Branch Press.)

ii. **The Natural Host of** *Phlebotomus minutus.*—*Indian Jl. Med. Research.* 1913. July. Vol. 1. No. 1. pp. 34-38. With a map and 1 plate.

i. The author is Imperial Pathological Entomologist, and his observations were made at Pusa, Bengal.

The larvae of Phlebotomus are killed by a comparatively short exposure to dry air; they are never found in dry or nearly dry earth. They require a moderate degree of moisture—such as that which generally occurs in English garden mould—protection from light, and the presence of nitrogenous refuse, the debris of dead insects, decayed fungi, and possibly insect and other dejecta; but an excess of this material is harmful. Bricks, stones, tiles, and cement form their common breeding haunts: but they have not been found in the brick work of wells, nor in latrines in Pusa.

Phlebotomi are often seen on lizards which do not resent their bites; it seems not improbable that they breed in the crannies in which lizards hide, and that the excreta of the latter may afford nourishment for the larvae. Howlett has seen phlebotomi in the surface galleries of termites' nests, and FLETCHER has made similar observations in Madras.

The number of larvae and pupae discovered at Pusa is small. A larva was found in the nearly dried mud of a cement channel leading from a well reservoir; another was captured in a small heap of kitchen refuse near a wall. Four larvae and seven empty pupa cases were collected from the damp earth between the bricks forming a platform for a "tulsi" plant in the courtyard of a house. The bricks were partially covered with algal growth, and in the crevices between them were ants, their larvae and nymphs, woodlice, larvae of Mycetophilidae, mites and nematode worms, with insect remains of many kinds on which the larvae were feeding. Five larvae, 3 pupae, and 23 empty cases were found in a small heap of bricks, tiles and other rubbish on waste land 30 yards from houses. The pupae were mostly on the edges of the tiles and bricks. Six adult flies emerged from damp algal muddy material collected from the sides of an open reservoir where water from several gutters leading from houses accumulates. The period of the year when larvae were caught was May to October.

ii. The distribution of the gecko or wall-lizard and of *P. minutus*, and their respective habitats, are closely similar. The *P. minutus*

breeds at Pusa at all times of the year, but it attacks man in the summer only. Since a repast of blood appears to be essential for the fertilization of the eggs, the phlebotomus must obtain this from some non-human source during the winter. The insect frequently may be seen sucking the blood of the common Indian lizards, *Hemidactylus gleadovii* and *Hemidactylus coctaei*, which do not appear to heed its attacks. In laboratory experiments it is easier to induce *P. minutus* to bite a lizard than a man; moreover the most suitable food for the larvae is lizards' faeces, or decayed mushrooms mixed with damp earth.

On examining the blood contained in the stomachs of 40 *P. minutus* captured in living apartments at the end of April and the beginning of May, lizards' red blood corpuscles were found in 24, and human in 11.

On two occasions a sand-fly was observed on the common toad, *Bufo melanosticticus*, but in 6 or 8 experiments the *P. minutus* sucked the blood of toads once only. Geckos therefore should be regarded as the natural hosts of *P. minutus*.

[Roubaud also noticed many *P. minutus* on a lizard; see this *Bulletin*, Vol. 2. p. 28.]

C. B.

Wenyon (C. M.). **The Length of Life of Phlebotomus in Captivity. A Note on a Method of Keeping the Flies alive for Experimental Work.**—*Jl. London School of Trop. Med.* 1913. Nov. Vol. 2. Part 3. pp. 170-171.

At Malta during the summer of this year porous earthenware vessels shaped like flower pots, standing in water and covered with the finest muslin, were used to confine sandflies. They were set free every second, third, or fourth day in a net of dimensions 7 × 7 × 7 ft. They almost invariably settled on the cotton top, and were re-captured by placing 2 × $\frac{3}{4}$ in. test tubes over them. They usually fed when the tube was inverted over the skin.

In the most successful experiment eight male and seven female sandflies were enclosed in the earthenware pot; all the males died within four days. The females were fed every other day. One died after nineteen days captivity; three survived 28 to 46 days. None of the flies deposited eggs, although on dissection all contained mature ova.

The results of the other experiments are not given.

C. B.

DENGUE AND UNCLASSED FEVERS.

Rouché. **Note sur une Epidémie de Dengue à bord de la "Manche" en 1911.**—*Arch. de Méd. et Pharm. Navales.* 1913. June. Vol. 99. No. 6. pp. 450-461.

In 1906, 1907 and 1908 epidemics of dengue were experienced on board the transport "Manche" while in Tonkinese waters, a very large proportion of the Europeans contracting the disease in each

epidemic. A further epidemic broke out in 1911, differing slightly from the former ones and in the early cases the diagnosis from malaria and influenza was difficult. The ship left Saigon on the 17th August, the first case was noted on the 6th of September and the last on the 3rd of November at Haiphong. 91 out of a total of 160 were affected, none of the natives on board contracted the disease either in this or the early epidemics and the incidence among the officers was very high (10 out of 12); the two who did not contract the disease in 1911 had already suffered from dengue in 1907, so that undoubtedly one attack gives definite protection. During the time of the epidemic mosquitoes (*C. fatigans*) were very abundant on board the ship and they evidently played an important rôle in the etiology, though from whence the infection was derived was not ascertained, neither were any bacilli or parasites found in the blood of the patients. The onset of the disease was abrupt; the fever lasted about 5-6 days; four types of temperature curves are described, the typical double fever was present in about a third of the cases and terminal rashes were rare. The convalescence was sometimes prolonged but there was no mortality. The prophylactic measures indicated were destruction of the mosquitoes and isolation of the infected.

P. W. Bassett-Smith.

Khan (Soleiman). **Dengue at Meerut.** [Correspondence.] — *Indian Med. Gaz.* 1913. May. Vol. 48. No. 5. p. 204.

In the recent epidemic of dengue, which like that of 1872 spread from east to north west of India, Meerut suffered severely. From August to the middle of September nine-tenths of the population contracted the disease; the writer himself treated 1,400 cases as out-patients. The symptoms were very definite, the onset was sudden, the rash generally appeared on the second day, and the crisis occurred about the fourth. The incubative period was not more than five days, there was no mortality, but relapses were fairly common. It was apparently not spread by food or water, though very infectious; it is noted that there were few mosquitoes but swarms of flies at the time. No experimental work was carried out relating to the etiology of the disease.

P. W. B.-S.

Dengue or Seven-Days Fever. Discussion at the Asiatic [Society of Bengal]. — *Indian Med. Gaz.* 1913. May. Vol. 48. No. 5. pp. 199-202.

In a discussion on Hossack's paper on Dengue read before the Asiatic Society of Bengal (see this *Bulletin*, Vol. 2. p. 30) many speakers agreed that there was no etiological difference between dengue and seven day fever. Rogers strongly opposed this view, chiefly on epidemiological grounds, and maintains that three day, seven day fever, and epidemic dengue are distinct diseases.

P. W. B.-S.

LALOR (N. P. O'GORMAN). **A Paper on the Aetiological Relationships of Seven-Day Fever. A Suggestion.**—*Proceedings of the Third Meeting of the General Malarial Committee held at Madras, Nov.* 18, 19, & 20, 1912. pp. 207-208. (1913. Simla: Govt. Central Branch Press.)

In the course of a Stegomyia survey of Rangoon the author noticed that seven day fever appeared to be localised in its distribution in a manner which suggested its association with the local prevalence of *Stegomyia fasciata.* He points out the similarity of the characters of this fever with yellow fever, both being probably due to filter passing mosquito carried viruses, and he suggests that the prevalence of this seven day fever in seaport towns might act as a weather gauge in India and Burma for estimating the risk of dissemination of imported yellow fever, a risk which will be more definite after the opening of the Panama Canal. He also suggests a number of aetiological experiments on the lines of those carried out with yellow fever to prove if this Stegomyia is really the carrier of the short local fever—which he considers to be a different entity from dengue.

P. W. B.-S.

ELLIOTT (M. S.). **A Case of Six-Day Fever.**—*U.S. Naval Med. Bull.* 1913. July. Vol. 7. No. 3. pp. 412-413.

The clinical course of the case coincides closely with seven day fever as described by CASTELLANI, and in most points with the cases of DEEKS from the Panama zone. The patient visited both Panama and Colon. The incubative period was 6-9 days, the temperature curve was characteristic, the pulse rate was slow and there was a marked leucopenia with a reduction of the polynuclear leucocytes, but the spleen was not enlarged and no eruption was noted. It was the only case which developed in the ship and the patient did not remember being bitten by any insects.

P. W. B.-S.

GABBI (U.). **Sulle "Febbri non Classificate" a Tripoli.**—*Commissione Governativa per lo Studio delle Malattie Tropicali nella Libia. Malattie infettive e Malattie cutanee.* 2° Contributo ad Opera di U. GABBI, F. SCORDO, G. RIZZUTI. (Ministero dell' Interno e d. Guerra. Direz. Gen. d. Sanità Pubblica.) pp. 23-30. 1913. Messina: Stab. Tipografico Guerriera.

The author gives a review of the literature of sub-tropical and tropical undetermined fevers. He then points out how difficult the clinical diagnosis of these fevers of "obscure origin" is from irregular typhoid, para-typhoid, colon infections and undulant fever, from all of which they may be separated by serum diagnostic reactions. Such forms were common in Tripoli and he describes two cases in Bedouin arabs, with irregular fever, slight gastro-intestinal symptoms, markedly enlarged spleens and negative serum reactions to all common organisms; both made good

recoveries without any particular treatment. There was no doubt that the patients were suffering from some infectious fever, probably a gastro-intestinal toxaemia. The presence of such infections is of great importance to all interested in civil and military medicine and sanitation; probably the dust laden winds in Tripoli are an important means of the distribution of the infecting agent, though food, cutaneous inoculation, and the intermediate action of flies must be considered. A very good bibliography is given.

P. W. B.-S.

VERRUGA PERUVIANA.

STRONG (R. P.), TYZZER (E. E.), BRUES (C. T.), SELLARDS (A. W.), & GASTIABURU (J. C.). **Verruga Peruviana, Oroya Fever, and Uta. Preliminary Report of the First Expedition to South America from the Department of Tropical Medicine of Harvard University.**—*Jl. Amer. Med. Assoc.* 1913. Nov. 8. Vol. 61. No. 19. pp. 1713-1716.

The authors give an historical account of verruga and Oroya or Carrion's fever, records of which can be traced as far back as the 17th century. Up to the present time it has been generally accepted that the two conditions are stages of a single disease, the acute fever being followed by the eruption. From their investigations they have come to the conclusion that verruga and Oroya fever are two distinct diseases, though not infrequently occurring in the same person.

Oroya fever is often very fatal and always associated with marked blood changes, especially in the number of nucleated red cells present and in the appearance in the protoplasm of the stained red cells of peculiar rod-shape inclusions called "Barton's bodies." Similar rods with some spherical and pear-shaped bodies were observed in this investigation in the fresh cells, when they appeared to possess definite motility, and were often very abundant in single cells. In stained specimens the ends of the rod-shaped forms were intensely coloured, having a chromatin appearance, and beading was seen. The spherical forms were from 0·3 to 1·0 micron in diameter and sometimes showed chromatin granules. The red cells may contain as many as 30 of these elements, which may also be seen in the various nucleated forms. It is presumed that these bodies destroy the red cells and produce the marked anaemia. The bodies appear to be closely allied to those described by GRAHAM SMITH in the blood of moles and classed by BRUMPT as a parasite under the name of *Grahamella.* The authors propose to create a new genus "Bartonia" and name the parasite of Oroya fever *Bartonia bacilliformis.* Detailed characters of the genus and species are given.

Verruga peruviana is a distinct specific disease differing from frambesia and syphilis, inoculable from man to man, and man to animals (monkeys, dogs and rabbits). A crucial experiment was

carried out on a Chilean volunteer. He was thoroughly inoculated through the scarified skin with the nodules of two verruga patients; sixteen days after local papules appeared and increased until the 35th day, when they were removed. No generalised eruption, no fever and no changes in the blood cells as in Oroya fever occurred.

[From the above it will be seen that the authors have thrown over the paratyphoid theory for Oroya fever, and emphatically accept as the cause of the disease a protozoal parasite, originally described by Barton, Gastiaburu and others, but which Nicolle and others looked upon as a product of cell degeneration. Further work on the subject will be required to establish this new genus and the term *Bartonia* will not stand as it is already in use as a generic name.]

P. W. Bassett-Smith.

Darling (S. T.). **Verruca Peruana.** — *Jl. Amer. Med. Assoc.* 1911. Dec. 23. Vol. 57. pp. 2071–2074.

In this paper (published in 1911) Darling gives fully the historical, clinical and etiological factors of verruga. According to Darling there are two types (1) A malignant form known as Oroya fever or Carrion's disease, general, without eruptive stage; (2) A benign form, with slight mortality and frequent eruption. In the section dealing with the etiology, the X bodies described by Barton in 1905 and thought by him to be parasites are fully described, and their relationship to *Babesia* and the endo-corpuscular bodies of Graham Smith (found in moles) pointed out. The very extraordinary alteration in the blood cells and the abundance of the nucleated forms found in the severe type of the fever are described. The knowledge of the limitation of the infective area and the common belief that infection occurred at night led Barton to insist that the railway workers should sleep in houses outside this area; after this was done there was a complete cessation of cases.

Darling considered that the endo-corpuscular bodies may be the cause of the disease.

P. W. B.-S.

Townsend (C. H. T.). i. **La Titira es Trasmisora de la Verruga.** [Transmission of Verruga by the 'Titira.']—*Cronica Med.* [Lima.] 1913. June 30. Vol. 30. No. 588. pp. 210-211.

ii. **Progress in the Study of Verruga Transmission by Bloodsuckers.** —*Bull. Entomol. Research.* 1913. Sept. Vol. 4. Part 2. pp. 125-128. With 3 plates.

iii. **The Transmission of Verruga by Phlebotomus.**—*Jl. Amer. Med. Assoc.* 1913. Nov. 8. Vol. 61. No. 19. pp 1717-1718.

i. In an investigation which the author as Government Entomologist of Peru carried out, with the object of solving the problem of the means of transmission of verruga, the results of experiments with ticks were completely negative and he also excludes Tabanus, Stomoxys, fleas, lice, bugs, and leeches. He made a personal inspection of the blood-sucking fauna of the infected district of San Bartolome, finding, besides mosquitoes, that a species of Phlebotomus was very common. On epidemiological grounds he believes that this fly is the transmitter of

the disease, for it was found to be most abundant in those hot steamy ravines with rank vegetation, where verruga was most prevalent; he considers that these ravines are ideal places for the flies to breed in. No experimental proof has so far been obtained. It is stated that for years past the natives of Peru have suspected a relationship between verruga and the Phlebotomus.

ii. The author describes the results of his observations to determine whether verruga is transmitted by bloodsuckers. No results were obtained to incriminate Phlebotomus, as sufficient numbers were not found owing to the season for the fly being nearly over; experiments are however to be carried out at the earliest possible opportunity. The plates show views of the Verrugas canyon, the Verrugas bridge, the building of which cost thousands of lives, and the canyons at Chosica below the verruga zone, where there is an absence of cover for Phlebotomus.

iii. To prove the Phlebotomus theory of transmission he obtained two hairless Mexican dogs. After they had been kept under observation for nearly three months, one was inoculated subcutaneously with the ground up bodies of twenty female Phlebotomus collected the night before in the Verruga canyon. On the 5th day the injected dog had lost flesh and appeared ill. The blood showed endo-globular bodies like Barton's X-bodies, nucleated red cells and broken down red cells. On the 6th day a typical nodular eruption was noticed on the right hind foot. On the 8th day the dog began to improve. Smears from one of the papules showed bodies resembling Leishmania. The control dog remained in perfect health. This being the first instance of experimental transmission of the disease by means of insects it is, the author writes, of great interest; the very short incubative period, absence of fever and early eruption are remarkable. The author states that dogs are less susceptible than man in that the disease runs a more benign course; mild cases in man being associated with little fever and early appearance of the eruption.

[If this experiment is confirmed by other investigators it goes far to prove that the fever, with its peculiar blood characters, and verruga are only stages of the same disease, but it is in direct opposition to the views of Strong and others expressed above.]

P. W. B.-S.

da Rocha-Lima (H.). **Zur Histologie der Verruga peruviana.**—*Verhandlungen der Deut. Pathologischen Gesellschaft.* 1913. April. pp. 409-416. With 1 plate and 2 text-figs.

The author gives a short history of the disease known as verruga or Oroya fever and draws attention to the occurrence of a rather similar condition in Brazil called Bassewitz's disease; the latter however does not show clinically the acute febrile onset common in Peruvian cases. At Hamburg, the author and others were able carefully to observe a recent case of verruga, and a full description of the histological characters of the growths which were removed

is given. He states that he was only able to examine the skin nodules, and that his views as to their structure differ to some extent from those of most authorities. His conclusions at the end of the paper are to this effect:—A verruga nodule consists of endothelial offshoots, blood vessels, and a more or less oedematous or haemorragic and lympathic (eventually leucocytic) infiltrated connective tissue, whose relative amounts and distribution in the nodes or in different parts of the same node, may show great variation, so that at one time a granulating, at another a sarcomatous, myxomatous or angiomatous appearance may be presented; of known affections the telangiectatic granulomata described by KONJETZNY* are those possessing the closest resemblance to the verruga tumours. Contagious circumscribed angiofibroma of the skin, found in south Brazil, and conditions of human botryomycosis though histogenetically related processes are not quite identical, differing principally by the fact that in telangiomatous granulomata the construction of vessels, in verruga the hyperplasia of the endothelium, appears to be the characteristic event.

P. W. B.-S.

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* KONJETZNY. *München. Med. Wochenschr.* 1912. Vol. 59. pp. 2219–2221.

HELMINTHIASIS.

American Society of Tropical Medicine. **Is the Importance of Intestinal Parasites in Tropical Pathology Exaggerated?** [Secretary's Abstract, by John M. Swan, of the discussion at the 10th Annual Meeting, 1913.] — *Amer. Jl. Trop. Diseases & Preventive Med.* 1913. Aug. Vol. 1. No. 2. pp. 169-172.

In Dr. E. R. Stitt's opinion the reduced death rate in Bilibid Prison, Philippine Is., from 75 to 9 per 1,000 after quarantining of persons harbouring intestinal parasites, indicates that some importance is to be attached to their presence.

Dr. C. Wellman some years ago investigated a disease among the fishermen in Western Africa which was characterised by a severe anaemia and was attended by a high mortality. The cause was found to be the *Dibothriocephalus latus*. In one district in West Africa 13 per cent. of the population was incapacitated by uncinariasis. The activities of the Rockefeller Commission have been highly beneficial in reducing hookworm disease. In highly malarial countries the presence of intestinal parasites affects the mortality in two ways. (*a*) Hookworm infection increases the mortality from malaria, and (*b*) over zealous treatment of hookworm disease increases the mortality from malaria. Some parasites such as *S. subtilis* [*Trichostrongylus instabilis* = *T. colubriformis*], *H. nana*, *T. trichiura*, etc. have been taken too seriously. It is possible that heavy infections with these may produce some anaemia. In some districts in the Tropics 100 per cent. of the children suffer from Ascaris infection. This worm produces convulsions and even stimulates recrudescence of malaria. He believed that the importance of intestinal parasites is not exaggerated.

Dr. Nichols considered that the intestinal parasites have not the serious influence that other [protozoal] parasites have because they cannot reproduce themselves in the intestines. It is perhaps necessary to exaggerate the importance of these parasites as a text for agitation to interest the public and legislators in necessary public health measures, but it is not essential for medical men to accept this exaggeration.

Dr. Craig thought that the hookworm is the only intestinal worm of great importance in tropical pathology. The schistosome is important but its *locale* is limited and the number of cases is small. In the southern parts of the United States the importance of the hookworm is being exaggerated. The hookworm campaign has improved the health of the people in districts in which there is no malaria, but whether anything has been accomplished in districts in which malaria is present is doubtful.

Dr. E. Stitt believed that the discovery of ova in the faeces frequently puts the clinician off the track. According to Dr. E. F. Otis of Porto Rico it does appear that infection with intestinal parasites produces a physical, vital and nervous effect that classifies children, particularly, as deficient. Certain intestinal parasites appear to produce a toxaemia.

R. T. Leiper.

LEIPER (Robert T.). **Observations on Certain Helminths of Man.**—*Trans. Soc. Trop. Med. & Hyg.* 1913. July. Vol. 6. No. 8. pp. 265-297. With 36 text-figs.

The paper is based upon a demonstration given before the Society of Tropical Medicine and Hygiene on June 20th, 1913. New points of interest relating to some of the parasitic helminths are given and diagrams, where those help the subject, are included. Writing on the *Lagochilascaris minor*, Leiper thinks these worms were undoubted wandering forms and have not found the intestine of man a congenial habitat. Possibly they are normal intestinal parasites of the cat in the West Indies and this idea is borne out by a closely allied form, *L. major*, having been found in the East African lion by the author.

Two instances of the occurrence of *Ascaris lumbricoides* in the dog are given, these are regarded merely as rare cases of accidental infection. As regards the *Physaloptera mordens* it is suggested that the monkey is most probably the normal "reservoir host." A new pair of papillae is described in *Acanthocheilonema perstans* (=*Filaria perstans*). This is said to lie between the solitary pair described by LOW, and the posterior extremity. The pre- or, as the author terms it, perianal group consists of four pairs as noted by LOW. Details are also given of the papillae and spicules of *Filaria loa* and *F. bancrofti*, diagrams showing these very clearly (figure).

Oesophagostoma apiostomum is said to be a common parasite of monkeys and produces in them dysenteric symptoms when the infection is severe. The first recognition of this species in man was made by Leiper from material collected by FOY in Northern Nigeria.

RAILLIET and HENRY propose to place *Triodontophorus deminutus* in a new genus, namely *Ternidens*. The name *Syngamus kingi* is given to the pair of "forked" worms found by KING, of St. Lucia, in the sputum of a patient. Correspondence has shown that the case was a genuine one. As regards the *Gnathostoma siamense*, it seems as if this was just the same as *G. spinigerum*.

Several new discoveries, some of great importance, have been made amongst the trematodes and these are discussed. Of these the most important is the finding of a new genus (*Yokogawa*) by the author. This is a new fluke from Japan, discovered by YOKOGAWA, and widely spread amongst the inhabitants of Korea, Formosa and Japan. KATSURADA had already placed this parasite in the genus *Tocotrema* but Leiper brings forward evidence to show that the character of the yolk glands is different from that of that genus and so has proposed the new genus *Yokogawa*, the name of the species now standing as *Yokogawa yokogawa*. Two interesting cases of infection with *Heterophyes* from the far East are mentioned. The position of *Opisthorcis noverca* still gives rise to trouble. We have now arrived, according to Leiper, at the following state of affairs:—"*Opisthorchis noverca*" *as it occurs in man* is placed in the genus *Amphimerus*, Barker, and becomes *Amphimerus noverca* (Braun, 1903), Barker 1911. The

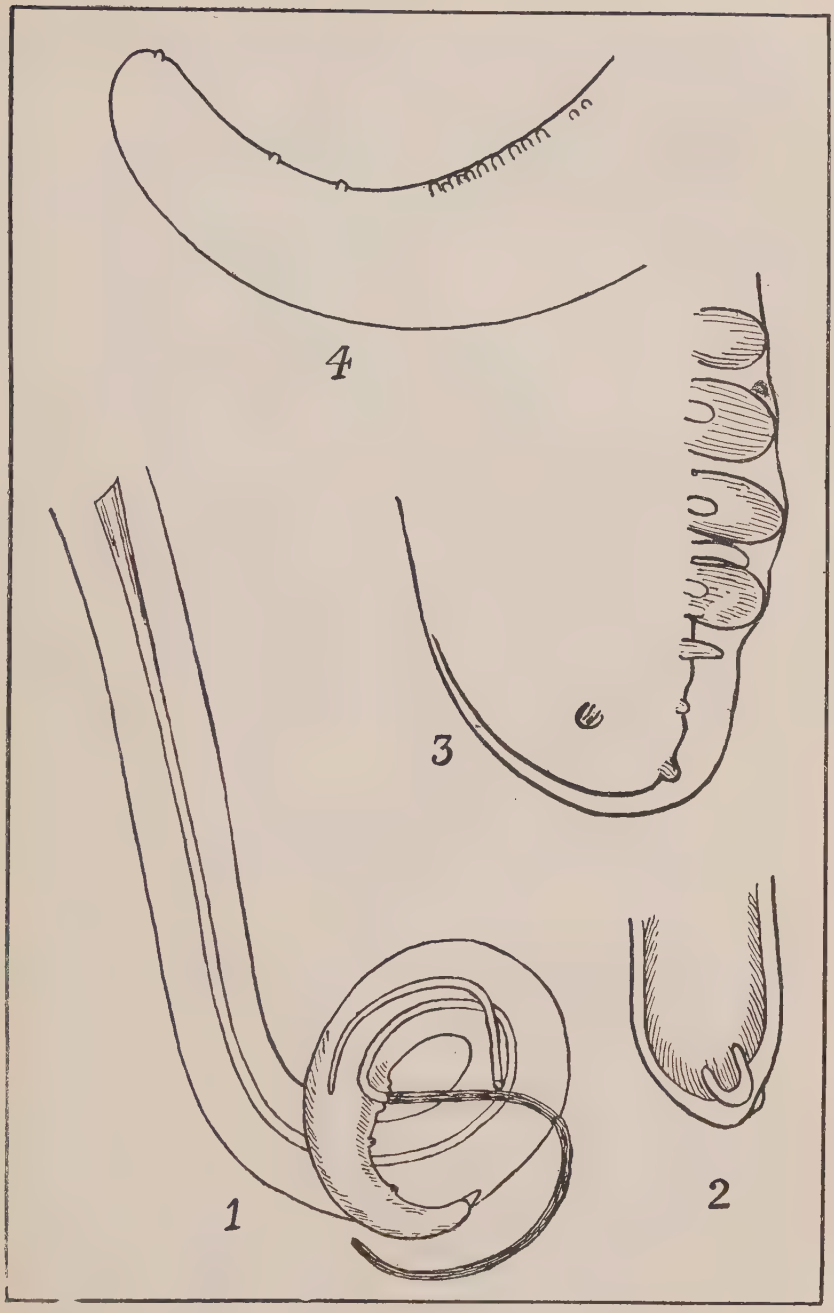

Fig. 1. Tail of *A. perstans* showing details of spicules and papillae.

Fig. 2. Posterior end of *F. ozzardi* (*demarquayi*) [type specimen] showing paired large fleshy papillae.

Fig. 3. Lateral view of tail of male *Loa loa* showing papillae, noted by LANE and the author.

Fig. 4. Posterior extremity of male *F. bancrofti* giving relative positions of the papillae.

"*Opisthorchis noverca*" of the dog is now *Paropisthorchis caninus* (Barker 1911), Stephens, 1912, with a stillborn synonym, *Paropisthorchis indicus*, Stephens, 1913." Leiper believes that these forms belong to one and the same species.

Regarding *Fasciolopsis* the following facts are fairly clear, viz. that the pig acts as a host of this genus and that spines are present on the skin in these forms. Kwan's fluke is not regarded as a distinct species. The only accepted characters distinguishing *F. buski* from other forms are (1) relative elongation, (2) lack of "muscularity," (3) absence of spines from the skin.

Fascioletta ilocana first described from the Philippines by Garrison, has recently been re-examined by Odhner and transferred by him to the genus *Echinostoma*, Rud. This has been done on account of the general topography and especially of the presence of a collar of spines around the anterior end of the body which is characteristic of the *Echinostomidae*.

Mathis and Leger, it is stated, have solved the mystery of the true host of *Gastrodiscoides hominis*. These authorities have found that no fewer than five per cent. of the pigs in Annam are infected by these worms. *Cladorchis watsoni* has been relegated to a new genus, viz. *Watsonius* by Stiles. Leiper from sections of some of the original material sent from Northern Nigeria had already come to the same conclusion.

[The paper is a very interesting one and brings into reasonable compass much recent work on human helminthiasis. Students of helminthology should therefore consult the original.]

G. C. Low.

Leiper (R. T.). **Seven Helminthological Notes.** — *Jl. London School of Trop. Med.* 1913. Nov. Vol. 2. Pt. 3. pp. 175-178. With 1 fig.

The presence of guinea worm in Nyasaland and of *Heterophyes heterophyes* in cases from the far East is recorded, also that of *Hymenolepis diminuta* in a child from Grenada, West Indies, and of *Paragonimus westermanii* in India.

The author states that a fluke described by Cobbold from the Mongoose (*Viverra mungus*) as *Distomum compactum* is a *Paragonimus* and may be the same species as in man; if so, the nomenclature will require revision, *Paragonimus westermanii* giving way to *Paragonimus compactus*.

Reference is also made to a statement made by Stitt that the two spicules in *Necator americanus* are constantly fused; the author has verified this and finds further that the spicules differ in several respects from those of *Ankylostoma duodenale*. They are provided with wide lateral expansions which are transversely striated, giving each spicule the appearance of a triangular file. These expansions gradually disappear, and the spicules when united show a delicate smooth ledge without striae, but slightly granular. This continues to the tip and forms the triangular piece. The rod-like portions of the spicules support this cuticular blade, one spicule being slightly curled to give support to

the proximal angle of the barb, the other continuing for some distance towards the extreme point.

G. C. L.

KAY (J. A.). **A New Ovum and its Miracidium.**—*Practitioner.* 1913. Oct. Vol. 91. No. 4. (No. 544.) pp. 580-582. With 1 plate.

LEIPER (R. T.). **A Comment on Two Recent Articles on Helminth Infections in Man.** [Memoranda.]—*Brit. Med. Jl.* 1913. Nov. 15. p. 1302.

In the article by Kay bodies are described which were believed to be the ova and miracidia of a new trematode.

From the figures and description, Leiper has not the slightest hesitation in affirming that the bodies do not bear any resemblance or relation to either ova or miracidia of a trematode and that they are certainly not even of helminthic origin. The figures and portions of the description might best be accounted for by the presence of Rotifers in the water used to dilute the urine.

He also refers to the recently described, supposed indigenous case of filariasis in Devonshire, published in the *British Medical Journal* (see this *Bulletin*, Vol. 2, p. 103). On an examination of the slides he found that the supposed filariae were minute filaments of cotton wool which had contaminated the freshly made blood films.

He expresses the hope that the above cases will not find their way into the text-books and quotes '*Filaria gigas*' as a familiar example of the manner in which such records may become stereotyped in spite of repeated repudiation by workers on helminthology.*

G. C. L.

CROWELL (B. C.) & HAMMACK (R. W.). **Intestinal Parasites encountered in Five Hundred Autopsies, with Reports of Cases.** —*Philippine Jl. of Science.* Sec. B., Trop Med. 1913. June. Vol. 8. No. 3. pp. 157-174.

A number of reports have been published bearing upon the incidence of the various intestinal parasites found in the Philippine Islands. These have been wholly based upon clinical examinations of the faeces. In the present paper the percentage incidence of the parasites is based solely, and for the first time apparently, upon postmortem records and taken from the files of the Pathological Department of the Manila College of Medicine and Surgery. During the year 583 consecutive autopsies were made and of these 83 have not been utilized. Of the 500 cases the overwhelming majority were Filipinos, but Americans, Europeans, Chinese, Japanese and East Indians are also included.

* If the editors of medical journals were to submit such papers to experts before accepting them, we should be spared much useless lumber. A. G. B.

The statistics were not checked by routine examination of the faeces and may have been affected somewhat by the fact that the majority of the cases came from a hospital where routine treatment for helminths is in vogue.

Incidence of intestinal parasites in 500 *Autopsies.*

	No. of cases.	Per cent.
Ascaris	206	41·2
Hookworm	83	16·6
Trichuris trichiura ...	172	34·4
Oxyuris	5	1·0
Taenia saginata	1	0·2
Clonorchis sinensis ...	2	0·4
Schistosoma	1	0·2

The view of Braun and others that Ascaris leave the human host in the course of febrile diseases is not substantiated by the series of cases of malaria, typhoid, plague, lobar pneumonia, and bacillary dysentery, in which the infection with Ascaris ranges from 26·6 per cent. to 66·6 per cent. In one instance an Ascaris was found in the vermiform appendix and in two cases numerous worms had passed through the bile duct into the liver, in one case giving rise to numerous abscesses, in the other to marked inflammation of the bileducts. Live Ascarides were found in the middle ear, in the bileducts, pancreatic duct, stomach, oesophagus and larynx but in all these cases these wanderings were believed to have taken place after death.

Trichuriasis occurred in 33·9 per cent. of the males and 35·4 per cent. of the females, while 15·53 per cent. of the cases were less than fifteen years old and 40·1 per cent. over that age. In two cases only were whipworms found in appendices removed on account of disease.

No example of the adult *T. solium* was encountered. This appeared surprising in view of the widespread occurrence of Cysticerci in the hogs in the Philippine Islands. In only one of 2,200 autopsies a case of infection of man with Cysticercus cellulosae was noted. [The cysticerci in the hogs possibly were the larvae of a dog tapeworm, e.g., *C. tenuicollis.*]

R. T. L.

Johnston (J. E. L.). **A Note on Helminthiasis in Bassa Province, Northern Nigeria.**—*Lancet.* 1913. Sept. 27. pp. 926-927.

An examination of the stools of thirty persons taken at random in Ankpa, the chief European station in the Bassa Province of Northern Nigeria, gave the following percentages of helminthic infection.

Single infection in 12 ...	...	(40 per cent.)
Double ,, ,, 6 ...	...	(20 ,, ,,)
Triple ,, ,, 1 ...	...	(3 ,, ,,)
No ,, ,, 11 ...	...	(36·6,, ,,)

The ova found were

Ankylostome (or Necator) in 14	...	(46·6 per cent.)
Ascaris lumbricoides ... ,, 6	...	(20 ,, ,,)
Taenia solium ... ... ,, 4	...	(13·3 ,, ,,)
Trichuris trichiura ... ,, 3	...	(10 ,, ,,)

Both Ankylostoma and Necator were recovered after anthelmintics.

In 26 of the cases the blood was examined and an eosinophilia was noticeable in almost every case, rising in one instance to 56 per cent. This was seen not only in the cases with ankylostome infection but with the others also. In some cases it was, in the opinion of the author, probably attributable to those skin eruptions termed generally "craw-craw."

Many cases showed great relative increase in the lymphocytes [? large mononuclears], possibly indicative of a preceding infection with malaria.

Haemoglobin was roughly estimated:—

1	had	40	per	cent.	haemoglobin.
3	,,	50	,,	,,	,,
1	,,	55	,,	,,	,,
13	,,	60	,,	,,	,,
1	,,	65	,,	,,	,,
5	,,	70	,,	,,	,,
1	,,	80	,,	,,	,,

In the case in which only 40 per cent. haemoglobin was found there was a large abscess besides an ankylostome infection.

The author believes that the Hausas are much less affected with ankylostomes than the Bassa pagans, and attaches importance to the fact that they use deep cemented lined pits for defaecation whereas the pagan tribes have no special arrangement.

Epigastric pain was an uncommon symptom in the above series; the earliest symptoms being dyspnoea and dizziness, especially in a bright light, followed by pains in the legs, oedema, etc. Several of these were extremely like cases of beriberi and in some ova were not found till the second or even third examination. [The association of these symptoms with so slight an infection of ankylostomes seems very questionable. It is possible that the Cestode ova observed were those of *Taenia saginata.* It is unfortunate that the number of leucocytes counted is not stated nor the method employed in the haemoglobin estimation.]

R. T. L.

Bourret. **Recherches sur le Parasitisme Intestinal, la Dysenterie et la Maladie du Sommeil à Saint-Louis (Sénégal).**—*Ann. d' Hyg. et Méd. Colon.* 1913. April-May-June. Vol. 16. No. 2. pp. 283-307.

The stools of 52 natives of St. Louis were examined in order to ascertain the diffusion of intestinal parasites among the general populace. 40 proved negative. One contained segments of *Taenia saginata,* two showed eggs of *Ascaris lumbricoides.* In three *Oxyuris* eggs were present while in two cases the eggs apparently of *Necator americanus* were found.

Of three Europeans two were negative and one showed infection with *Trichocephalus* [*Trichuris*] *trichiurus.*

R. T. L.

Schistosomiasis.

Harrison (W. S.). **The Prognosis in Bilharziasis.**—*Jl. R. Army Med. Corps.* 1913. Oct. Vol. 21. No. 4. pp. 385-388.

The cases of bilharziasis contracted during the South African War have afforded unique and reliable information regarding the duration of an infection and the degree of disability which results. From a study of 466 of these cases it is concluded that bilharziasis is a much more prolonged disease than has been usually supposed. The earliest period at which recovery may be hoped for is from five to seven years after the onset of symptoms while it may last without relief for at least thirteen years. The direct and indirect mortality from bilharziasis among Europeans removed from the endemic area probably does not exceed one per cent. Out of the 466 cases blood had been absent from the urine from two or more years in 141, but in 23 of these ova were still present. In 133 cases blood was found intermittently and in quite a number of cases signs of infection returned after having been in abeyance for over two years. The course of many of the cases strongly suggested the possibility of reinfection from the patient's own urine. In 164 of the cases blood and ova were present in the urine continuously. In 5 of these the disease had lasted for 13 years, in 16 for 12 years and in 57 for 11 years. There were 28 deaths; 7 were possibly attributable to bilharziasis. Of these two, regarded as open to doubt, were "carcinoma of the bladder" and "internal haemorrhage." Although 8 deaths were due to tubercle this is not regarded as indicative of an increased tendency resulting from the bilharzia infection as official returns show that in England 29 per cent. of all deaths of males between the ages of 25 and 45 are due to phthisis.

R. T. L.

Edgar (W. H.). **Yangtsze Fever.**—*Jl. State Med.* 1913. Sept. Vol. 21. No. 9. pp. 542-553.

The terms Yangtsze fever, river fever, Hankow fever or urticarial fever have been applied in the past by those practising in the foreign communities in the valley of the Yangtsze-kiang, in China, to any attack of fever of an undetermined nature. It is now considered that the name Yangtsze fever may be confined to a well marked condition which typically is a remittent form of pyrexia lasting from three to six weeks. For the first few days the patient feels out of sorts, and especially towards evening there is a headache and achings in the loins and limbs which become daily more pronounced. The temperature rises to 103° F. or so at nights, falling to about normal in the morning. The subjective symptoms set in usually shortly after noon and the height of the fever is generally reached by 6 p.m. Rigors are rare.

The temperature is suggestive of malaria but no parasites are to be seen in the blood. There is however a marked eosinophilia of from 12 per cent. to 50 per cent. which with the daily temperature is extremely characteristic if not actually pathognomonic of the condition. The temperature continues to rise daily to 103° F.

for a week and then gradually falls day by day, reaching normal during the third or fourth week. About half the cases have a further characteristic, *viz.*, a marked tendency to localized oedema. This occurs early and often is the first symptom. These lesions appear as large annular patches, hard to the touch and often accompanied by marked itching, resembling in fact ordinary urticaria. In some cases the lesions are transient, in others they continue throughout the fever. Localised oedema may occur also in the lungs, producing signs of consolidation and accompanied by a dry cough, rarely cyanosis and sudden dyspnoea.

A painless and transitory diarrhoea probably due to localized patches of oedema of the great intestine is often present at the onset; more usually however the stools are large and hard. In some cases dysenteric symptoms predominate and the ova of *S. japonicum* can be found in the faeces.

In addition to these major symptoms *anorexia* and *mental irritability* are especially marked.

During the incidence of the fever the patient loses much weight and strength and the resulting debility may be serious to those who already suffer from malaria or dysentery. The mortality is however *nil* and with a change of climate normal health is regained in two or three months.

As the condition chiefly attacks young men and children and as the victims always give a history of having bathed in creeks or waded in marshy ground while shooting, it was supposed that the fever was due to some organism found in muddy water, which probably gained entrance through the skin. Dr. O. T. Logan first noted the incidence of *S. japonicum* ova in the stools of a child suffering from "urticarial fever" with dysenteric symptoms and since then much evidence has been forthcoming to substantiate the theory that this parasite is the causative agent of the disease. Surgeon J. Verdon, R.N., is quoted as writing, from Kiukiang, the opinion that the cases under his care were due to some form of food poisoning.

Treatment is symptomatic. Quinine is useless at first but exercises a beneficial action after the third week or so. Acetylsalicylic acid in 10 or 15 gr. doses as the temperature begins to rise each day is unsurpassed for the pain, aching and headache. The urticaria may require a soothing lotion but an occasional Izal bath is more effective. The diet should be liberal after the first few days and a change to the coast should be made, if possible, as soon as the evening temperature remains normal.

R. T. L.

Taeniasis.

Dévé (F.). **Echinococcose secondaire embolique périphérique.**—*Compt. Rend. Soc. Biol.* 1913. July 25. Vol. 75. No. 27. pp. 100-102. With 1 text-fig.

Eleven years ago the author demonstrated the formation of pulmonary embolic or metastatic echinococcus cysts after the

experimental injection of hydatid material into a *vein* in the ear of a rabbit. A new experiment is now recorded to show that the injection of scolices into the carotid artery results in the development of embolic peripheral cysts.

R. T. L.

Ankylostomiasis.

Leiper (Robert T.). **The Apparent Identity of** *Agchylostoma Ceylanicum* **(Looss, 1911), and** *Agchylostoma Braziliense* **(Faria, 1910).**—*Jl. Trop. Med. & Hyg.* 1913. Nov. 1. Vol. 16. No. 21. pp. 334-335. With 1 text-fig.

Lane records the occurrence of *Agchylostoma ceylanicum* as an occasional parasite of man and an almost constant parasite of cats and dogs in Bengal. Specimens of these were sent to Leiper at the London School of Tropical Medicine and the difference in the subdivision of the dorsal ray was noticed. In *A. duodenale* the elongated dorsal ray is bifurcated near its tip and the subdivisions resolve themselves into three small finger-like branches; in *A. ceylanicum* the primary subdivisions resolve themselves into two terminal branches (see figure).

Fig. 1.

Fig. 2.

Fig. 1. Dorsal ray of *A. ceylanicum* vel *braziliense.* (Reproduced by permission from the *Jl. of Trop. Med. & Hyg.*)
Fig. 2. Dorsal ray of *A. duodenale.*

In a paper recently published by Gomes de Faria in Brazil a new ankylostome was described. These parasites were found commonly in cats and in one instance in a dog. A comparison of Lane's figures, descriptions and material from Bengal with the paper and illustrations of Faria from Brazil have led Leiper to conclude that these two species are identical. The common occurrence of the same parasite in cats and dogs in Bengal and Brazil suggests that the form will be met with in other parts of the world as well, but the author in examining his own material from cats and dogs from Africa has not so far encountered it. He suggests that workers in China should re-examine supposed

specimens of *A. duodenale* carefully in the light of the new facts now available.

A note is added at the end of the paper with regard to the spelling of the generic name *Agchylostoma.* The committee of the International Congress of Zoologists, now drawing up a list of generic names which shall be placed outside the possible operation of the Law of Priority, has adopted the spelling *Ancylostoma.* The author, however, points out that these International Rules apply solely to nomenclature and that corresponding terms such as Ankylostome and Ankylostomiasis do not come under their operation as no "Rules of Terminology" have yet been formulated. The spellings agchylostome, agchylostomiasis, ancylostome, and ancylostomiasis have no special authority, and may be discarded therefore as pedantic.

G. C. L.

MOORE (A.). **Remarkable Emaciation in a Case of Hookworm Disease.**—*Amer. Jl. of Trop. Diseases & Preventive Med.* 1913. Oct. Vol. 1. No. 4. pp. 294-295. With 2 illustrations.

Two photos illustrate the extraordinary emaciation which supervened in a professional trapper of 20 years of age apparently as a result of an ankylostome infection. A year previous the patient had had typhoid fever from which he never regained his strength. Since then treatment was followed under medical advice for tuberculosis and for pellagra. Distressing diarrhoea, complete anorexia and inability to retain nourishment were the outstanding clinical features of the case. These were promptly relieved by thymol. During four weeks spent in hospital there was rapid recovery.

R. T. L.

KEITH (R. D.). **The Treatment of Ankylostomiasis.**—*Lancet.* 1913. Oct. 18. pp. 1117-1118.

WATSON'S recent statement* underestimates the importance of ankylostomiasis in Malaya, at least as regards Singapore and Johore. From a study of 70 cases the percentage of haemoglobin is considered a point of great importance. With the percentage in the neighbourhood of 60 the ova will usually disappear within a few days with suitable treatment. At 45 per cent. to 55 per cent. treatment will be more difficult and anywhere below 40 per cent. indicates that great patience will have to be exercised. When the haemoglobin drops to 10 per cent. to 20 per cent. weeks or months even may pass before recovery is effected.

The general condition may be improved with rest and diet, and the oedema may disappear although the haemoglobin index remains persistently at about its original level.

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* *Brit. Med. Jl.*, 1912. Nov. 2. p. 1201.

The ova do not disappear from the stools after treatment probably on account of their retention on the walls of the intestine, the survival of worms embedded in the mucus, and reinfections.

Beta-naphthol in 30 gr. doses the first thing every morning is thought from certain recent cases to be more effectual than thymol or eucalyptus. It is neither necessary nor even advantageous to starve the patient prior to the administration of the drug as there is not much food in the upper part of the intestine five or six hours after a meal.

R. T. L.

YOSHIDA. **On the Haemolysis by Thymol.**—*Sei-I-Kwai Med. Jl.* 1913. Oct. 10. Vol. 32. No. 10. (Whole No. 380.] pp. 125-126. (The Original in No. 3, Vol. 1, of the Japanese Med. Soc.)

Cases of haematuria have occurred in the course of the administration of thymol for ankylostome infection, especially in anaemic subjects and those who have suffered frequently from malaria. Investigations have led the author to conclude that (1) Thymol has a very strong haemolytic action; (2) the normal blood serum has a marked protective power, due to the presence of sulphates and sulphuric acid which render the thymol harmless by combining with it; (3) the resisting power of the red blood corpuscles of patients with ankylostomes is not much below that of the healthy person, while it is slightly weaker in patients suffering from ankylostomes along with an enlarged spleen from chronic malaria; (4) The protective power against thymol haemolysis in ankylostome infections shows hardly any difference from that of the normal serum.

R. T. L.

GIUDICE. **Sur un Cas d'Appendicite à Ankylostomes.**—*Ann. d'Hyg. et Méd. Colon.* 1913. April-May-June. Vol. 16. No. 2. pp. 436-440.

The author gives a detailed clinical history of a case in which a perforated appendix was found to contain seven ankylostomes. Of these five female worms were fastened to the mucosa while two males were discovered under the mucous membrane in the neighbourhood of the ulceration which led to the perforation. The appendix was 6 cms. in length, supple and normal in shape; its lumen was not obstructed. There was no sign of chronic inflammation and the appendicitis is attributed to the damage done by the worms. Although a third of the cases of appendicitis are said to be due to intestinal parasites the ankylostome has not hitherto been associated with the condition. [The species of ankylostome is not stated and no details regarding the worms are given. It is *possible* that the parasites are oesophagostomes, for which the large intestine and especially the caecum is the normal habitat, *vide* THOMAS's case from Brazil.]

R. T. L.

Ascaridiasis.

Le Roy des Barres. **Note sur un Cas d'Ascaridiose hépatique.**—*Bull. Soc. Méd.-Chirurg. de l'Indochine.* 1913. July. Vol. 4. No. 7. pp. 329-330.

Barres records an extraordinary series of symptoms extending over a period of years, which were diagnosed as due to ulceration of the stomach or possibly associated with lesions of the gall bladder, but on operation proved to be due to the presence of *Ascaris lumbricoides* in the bile duct

The patient was 36 years of age and had suffered intermittently from abdominal pain for 20 years. These pains had become almost of daily incidence during the past three years and of increasing severity, and during the last year were almost intolerable. The pain was epigastric, radiating to the flanks and to the right shoulder, and occurred about half an hour after food. Vomiting was frequently induced by the patient himself to relieve his agony. The vomit consisted of food mixed with a large amount of mucus. Haematemesis never occurred. The gastric juice showed a hyperacidity of about one third over normal, and gastric ulcer, with the possibility of a lesion of the gall bladder, was diagnosed. As the general condition became gradually worse laparotomy was performed and a small cicatrix was observed on the anterior surface of the stomach near the pylorus. The cystic duct was found to be almost obliterated while the gall bladder was distended to the dimensions of a medium sized pear. The bile duct was dilated to the thickness of a little finger and from it were evacuated two *Ascaris lumbricoides* and a calculus of the size and shape of a prune-stone. The case terminated fatally.

R. T. L.

Row (T. G. S.). **Round Worms and Pregnancy.**—*Indian Med. Gaz.* 1913. Oct. Vol. 48. No. 10. pp. 395-396.

On the tenth day of the puerperium, which had proceeded perfectly normally, the temperature suddenly rose to 105° F. There was constipation, the tongue was thickly furred and the lochial discharge, which was gradually lessening, turned again blood red in colour and became quite profuse. There was slight wandering at times and, except for the lochial symptoms, most of the symptoms of puerperial septicaemia began to supervene. The fever continued for six days between 103° F. and 105° F., rising in the evenings without abatement in spite of calomel, quinine and other antipyretics. Involution progressed satisfactorily and the discharge was free and odourless. An efficient dose of santonin followed by an ounce and a half of castor oil effected the discharge of about 20 round worms. The temperature almost immediately returned to normal and in a couple of days the discharge had diminished and the general condition had considerably improved. Recovery followed. As three similar cases had been encountered the routine treatment of a 5 gr. dose of santonin on the 4th night after delivery has been adopted with success by the author, santonin being an *emmenagogue* as well as an *anthelmintic.*

R. T. L.

GALLET DE SANTERRE. **Cas de Diarrhée Dysentériforme d'Origine Ascaridienne.**—*Ann. d'Hyg. et Méd. Colon.* 1913. April-May-June. Vol. 16. No. 2. pp. 452-454.

In six cases admitted to the hospital at Hanoï as diarrhoea, dysenteric diarrhoea or dysentery an examination of the faeces revealed numerous ova of Ascaris. After treatment with calomel, santonin and castor oil the stools became normal and the patients were dismissed as cured.

R. T. L.

DRACONTIASIS.

LISTON (Wm. Glen). **Report of the Bombay Bacteriological Laboratory for the Year 1912.** (Section 6. Dracontiasis, Guinea-Worm Disease. pp. 32-36.) 1913. Bombay: Printed at the Government Central Press.

The author states that Dr. TURKHUD has continued his investigations into the etiology of guineaworm disease.

The embryos of the guineaworm do not seek out the cyclops but are sought after and swallowed as food by the cyclops. The worm can be seen at first coiled up within the stomach of the intermediate host, whence it escapes into the body cavity by rupture of the gut wall. The young worm thereafter undergoes developmental changes which result in the shedding of its original skin at about the seventh day.

Cyclops containing living guineaworms have been kept alive for 53 days. Attempts to experimentally infect twelve *Macacus sinicus* were fruitless. Some were fed by stomach tube with water containing a number of living cyclops which had been infected from six to fifty-three days previously with guineaworm embryos. Again, embryos were placed upon the abraded skin and injected subcutaneously. The monkeys have now been under observation for more than a year and although some have been carefully examined post-mortem no worms have been detected.

It is observed that even in the most severely infected villages where the village animals (cats, dogs, goats, hens, and cattle) partook of the same water as the inhabitants none of these animals were ever known by the villagers to suffer from guinea-worm.

Five persons, having volunteered, were given each five infected cyclops in which were one to two guineaworms fourteen days old, but sufficient time has not yet elapsed for results to manifest themselves.

At a small village called Sarsola, about ten miles from Thana, a well was found in which out of 114 cyclops examined no fewer than 44 were found naturally infected with Dracunculus larvae. It was learnt that it was a common practice among the boys to scramble down the steep sides and bathe in the well which contained at times little more than enough water to fill a moderately sized bath tub.

R. T. L.

O'Donoghue (D. F.). **Case of Guineaworm.**—*Jl. London School of Trop. Med.* 1913. Apr. Vol. 2. Pt. 2. p. 146.

A fluctuating tumour over the middle half of the right tibia was found, on incision, to contain reddish-looking pus and four female Guineaworms. The patient, when first seen, complained of pain and swelling in the leg, headache and vomiting. There was a temperature of 102° F. An urticarial rash extended from the hip to the ankle.

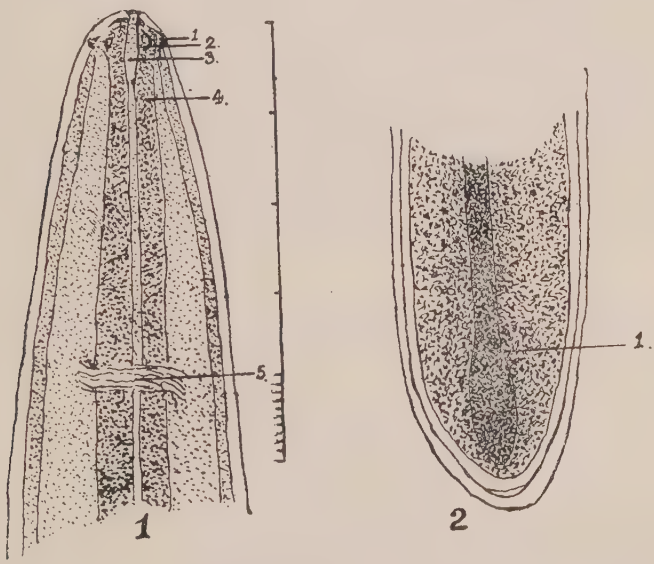
[A differential blood-count showing some eosinophilia is given. As the likelihood of an intestinal infection with helminths does not appear to have been considered the details are omitted as valueless].

R. T. L.

Unclassed.

Smith (A. J.) & Denney (O. E.). *Agamomermis Restiformis* **(Leidy), Stiles, (?) from the Human Urethra.**—*Amer. Jl. Trop. Diseases & Prev. Med.* 1913. Oct. Vol. 1. No. 4. pp. 281-287.

In 1880 Leidy described under the name *Filaria restiformis* a blood red worm, passed alive from the urethra by a labourer in West Virginia. Among others Railliet regards the case as



Agamomermis restiformis.

Fig. 1. Anterior extremity of specimen : 1, 2, papillae ; 3, pharynx ; 4, oesophagus ; 5, neural ring.
Fig. 2. Tail end of specimen : 1, blind extremity of intestine (?).

spurious as this " Filaria " belongs to the *Mermithidae* which are parasitic only in insects.

A second case is recorded in the present paper. The worm was passed from the urethra by a man of the so called " poor white

class" in North Carolina, who had, some few days previously taken a large dose of spirits of turpentine. Before this he had complained of pain in the back, difficulty when assuming a standing posture and pain of a bearing-down character in the region of the bladder. After the worm was removed these symptoms subsided and have not returned.

The parasite is a cylindrical filariform worm almost 20 inches long and of peculiarly rigid consistence, mouth is terminal without lips but surrounded by six papillae, alimentary canal incomplete, practical absence of generative parts, peculiar diagonally striated fine markings of the skin, and Holomyarial type of muscular arrangement (see figure). There seems little doubt that the specimen is an undeveloped form, probably the second larval stage, of a Mermis.

R. T. L.

McNeil (H. L.). **An Improved Method of Extracting Ova from Stools.**—*Jl. Amer. Med. Assoc.* 1913. Nov. 1. Vol. 61. No. 18. p. 1628.

A slight modification of Yavita's method of extracting ova from stools has given the author excellent results.

A particle of the stool about the size of a cherry is placed in a test tube; 5 cc. of a 25 per cent. mixture of antiformin is then added. This is mixed well and warmed over a flame but not boiled. Five per cent. of ether is then added and the whole well shaken. The mixture is then filtered through one layer of gauze and centrifuged for one minute by water centrifuge. Four layers are formed. The eggs are found in the lower layer. It is claimed that this method is superior to that recommended by Dock and Bass as it requires less time and less residue is thrown down with the ova. It is valuable in detecting hookworm ova in stools as the capsule of the egg is not injured in the least by the mixture.

R. T. L.

Manceaux (L.). **Sur les Polynucléaires Éosinophiles Hématophages.** —*Compt. Rend. Soc. Biol.* 1913. Oct. 24. Vol. 75. No. 29. pp. 240-241.

M. Weinberg and P. Séguin in a recent publication showed that the polynuclear eosinophiles were capable of digesting not only bacteria but red cells as well. These results, based upon experiments *in vitro*, are now confirmed by observations *in vivo* upon pleural exudate in two successive cases. M. Weinberg, commenting upon the communication, adds a note that the red cells of the horse when injected into the peritoneal cavity of the guinea-pig are not only engulfed but also completely digested by the eosinophiles.

R. T. L.

TYPHUS.

ANDERSON (John F.). **The Problem of Typhus in the United States.** —*Jl. Amer. Med. Assoc.* 1913. June 14. Vol. 60. No. 24. pp. 1845-1846.

After calling atention to the identity of Brill's Disease with typhus, the author proceeds to discuss the prevalence of typhus in the United States.

Assuming the ratio of one case of typhus to 47 of typhoid, found by LEE in the Massachusetts General Hospital (see this *Bulletin,* Vol. 2, p. 3), it is estimated, from the number of cases returned as typhoid, that during 1912 typhus was present as follows:—

New York ...	72 cases.	Chicago ...	22 cases.
Baltimore ...	22 ,,	Philadelphia ...	34 ,,
Boston ...	10 ,,	Washington ...	12 ,,

The above assumption is probably an underestimate, for at the Jewish Hospital of Brooklyn during the years 1910, 1911, and 1912 the ratio of typhus to typhoid was as high as 1 to 2·6 instead of 1 to 47.

Also in New York, during 1910, 3,735 cases of typhoid were reported to the department of health, and from Lee's ratio the number of cases of typhus would be 77. During that year 59 cases of typhus occurred in two of the hospitals, which leaves only 21 more cases to be accounted for in all the other hospitals and in private practice. In view of this it is certainly reasonable to assume that the estimated number of 77 is far below the number of cases that actually occurred in that city. Therefore although the disease has had a low case mortality and shows but little tendency to spread, it appears to be more widely distributed in the United States that has hitherto been supposed, and the possibility should ever be borne in mind that it may acquire virulence and epidemic prevalence.

E. Hindle.

HEGLER (C.) & VON PROWAZEK (St.). **Untersuchungen über Fleckfieber. (Vorläufiger Bericht.)** [Observations on Typhus. (Preliminary Note.)] — *Berlin. Klin. Wochenschr.* 1913. Nov. 3. Vol. 50. No. 44. pp. 2035-2040.

The authors observed more than a hundred cases of typhus in the hospital at Belgrade in the early part of 1913, during the epidemic that attacked the Servian army.

Their observations are divided into two parts, the first on the clinical symptoms being by Hegler, whilst the second part, on the etiology of the disease, is by Prowazek. In the first part Dr. Hegler remarks that the epidemic was not very severe, as the mortality was only about 10 per cent., though in Belgrade it was somewhat higher. Most of the cases were in men between the ages of 20 and 30 and the majority of the patients were total abstainers. The incubation period was usually 12 to 14 days but in some cases as long as 3 weeks. In the majority of the patients the fever continued for 10 or 12 days at 39°-40° C.,

and then dropped to 35° or 36°. The patients were usually kept in hospital for another fortnight after the temperature dropped before being discharged.

In addition the author gives a detailed account of the various clinical symptoms observed, together with notes on the complications, diagnosis, and prognosis of the disease. With regard to prophylaxis great care was taken to remove all lice (body and head) from the patients and as a result there were very few cases of hospital infection, whilst in the field hospitals of Southern Servia, where these precautions were not taken, there were numerous cases of infection being acquired in the hospital.

In the second part, Prowazek gives an account of the examination of 51 cases and also experimental work with animals performed with a view to discover the causative agent of the disease. In the blood of these 51 patients examined at Belgrade the polymorpho-nuclears did not present the changes typical of many other febrile complaints. Instead the nucleus shewed signs of fragmentation and the whole leucocyte became filled with particles of chromatin. These cells, with Giemsa, stained intensely red and were found to contain numerous long or round bodies, also diplococcus forms, and frequently irregular granules in addition. At the beginning of the infection very many of the leucocytes are free from these bodies but later more of them shew this appearance. [These leucocytes seem to be identical with those referred to by Rabinowitsch, as "Türkischen Reizformen," see below p. 643.]

The author then proceeds to discuss the nature of these intraleucocytic bodies and inclines to the opinion that they are related to the Strongyloplasma described by Lipschütz, that belong to the Chlamydozoa. During convalescence these bodies agglomerate in the cells and finally tend to disappear.

In addition the curious double bodies, first described by Ricketts and Wilder, were observed in the blood of a number of cases but the author remarks that the significance of these forms is still very obscure. In the exudate of a blister (produced by a Spanish Fly Blister) polymorpho-nuclear leucocytes containing the round and long bodies were observed, but the proportion of leucocytes shewing these bodies was not greater than in the case of those in the blood. On examination of sections of the organs of typhus cases, trachoma-like bodies were observed in the endothelial cells of the heart, lung, liver, kidney, etc.

Monkeys were infected both by the injection of blood from typhus patients and also, in one case, by injecting a louse that had been removed from an infected person two days previously. Charts are given illustrating the course of the temperature in two of these monkeys. Guineapigs on which infected lice were fed did not, as would be expected, shew any rise in temperature or other signs of infection. These animals, however, were easily infected by injections of blood both from a typhus patient and an infected monkey. [The injection of lice apparently was not attempted.] In neither monkeys nor guineapigs were the typical bodies observed in the leucocytes. Infected lice were carefully examined and in one case small coccoid bodies, and also diplococcus forms were observed.

In conclusion the author gives particulars of methods for staining the small bodies occurring in the leucocytes of typhus patients.

[It is evident that further work on the etiology of typhus is much to be desired, as Prowazek does not seem to come to any definite opinions regarding the causative agent of the disease.

No mention is made of Rabinowitsch's Diplobacillus.]

E. H.

Arzt (L.) & Kerl (W.). i. **Variola und Flecktyphus Studien an den bosnischen Rückwanderern aus dem Balkan.** [Studies on Smallpox and Typhus amongst the Bosnians returning from the Balkans.]—*Wiener Klin. Wochenschr.* 1913. May 15. Vol. 26. No. 20. pp. 787-795.

ii. **Ueber den Typhus exanthematicus. Beobachtungen im Seelazarett San Bartolomeo (dir. Arzt See-oberarzt Dr. M. Kaiser) gelegentlich der Flecktyphusepidemie im Frühjahr 1913.** [Typhus Fever. Notes and Observations in the Marine Hospital of St. Bartholomew during the Typhus Epidemic of the Spring of 1913.]—*Arch. f. Dermatol. u. Syphilis.* Orig. 1913. Sept. Vol. 118. No. 1. pp. 386-464. With 3 plates.

i. The authors have examined cases of both smallpox and typhus occurring in the Lazaret St. Bartholomeo, Trieste, amongst the Bosnians returning from the Balkans.

With regard to typhus it is interesting to note that, although it is generally an extremely rare disease, amongst the refugees returning from the Balkans several cases were observed and therefore the association between war and typhus seems to be still maintained.

The description of twelve of these cases is reserved for a future communication, but a detailed account is given of the clinical symptoms of two women suffering from the disease. The breaking out of haemorrhages is said to be a general and characteristic symptom, accompanied by the development of the typical exanthem.

With regard to the causative agent of the disease the authors have never been able to detect any specific micro-organisms in the blood. Moreover, employing the method described by Rabinowitsch (this *Bulletin*, Vol. 1, p. 400) they have obtained uniformly negative results with the deviation of the complement.

ii. This is a more detailed account of the above with lengthy references to the literature on the subject and is accompanied by three coloured plates illustrating certain types of exanthem.

E. H.

Lévêque. **Note sur l'Endémie Typhique de l'Aurès: "La Fièvre de Tkout": Typhus ou Paludisme? (Rapport des 9 Septembre 1910, 28 Novembre 1910, 3 Fèvrier 1912, et 18 Mai 1913).**—*Arch. de Méd. et Pharm. Militaires.* 1913. Aug. Vol. 62. No. 7. pp. 203-204.

The station of Tkout, Aurès, founded by the French in Algeria in 1885, has always had a very bad reputation from a health point

of view, as a large proportion of all Europeans sent there succumbed to a hitherto undiagnosed fever. The author has made several visits to this region and is of the opinion that this so-called "Tkout Fever" is merely typhus. The evidences in support of this view are: (1) the almost constant presence of a petechial exanthem in the patients; (2) the contagious nature of the disease; (3) its spread by nomadic tribes in the course of their wanderings; and (4) the indisputable occurrence of typhus in the province of Aurès, which has been regarded as a centre of this disease for a very long period.

E. H.

KULKA (Wilhelm). **Der Flecktyphus und die gegenwärtigen Ergebnisse seiner Aetiologie und Epidemiologie.** [Typhus and the Present State of our Knowledge of its Etiology and Epidemiology.]—*Das österreich. Sanitätswesen.* 1913. Nov. 6. Vol. 25. No. 45. pp. 1505-1513.

This article consists of an excellent summary of our knowledge of the etiology and epidemiology of typhus with special reference to its occurrence in Galicia.

E. H.

RABINOWITSCH (Marcus). i. **Ueber den Flecktyphuserreger.** [The Etiology of Typhus.]—*München. Med. Wochenschr.* 1913. Nov. 4. Vol. 60. No. 44. pp. 2451-2452.

ii. **Hämatologische Diagnose des Flecktyphus.** — *Deut. Med. Wochenschr.* 1913. Nov. 6. Vol. 39. No. 45. pp. 2199-2200.

i. The author recalls that in 1908 he discovered the causative agent of typhus and named the organism *Diplobacillus exanthematicus.* He then proceeds to discuss an article by P. T. MÜLLER (see below) and in addition gives some further information regarding this Diplobacillus.

In fresh cultures the organism practically always appears as a diplobacillus and degeneration forms only develop in old cultures. In fresh cultures the organism is always Gram-positive whilst in old ones it becomes Gram-negative.

Cultures are best obtained by using a medium consisting of the best ascitic-broth (āā) mixed with four per cent. glycerin. 100 cc. of this mixture must be injected with three to five cc. of the blood of a typhus patient obtained shortly before the crisis. After the crisis the organism seems to disappear from the blood.

Guinea-pigs can be infected both by the injection of cultures and also the blood of typhus patients. The virulence of the disease varies very much, for in some cases the incubation period in the animal was only five days, whilst in others it was as much as 37 days. When the guinea-pig develops the disease it shews a rise in temperature of 1½ to 3° for a period of three to eight days. During this period pure cultures of the Diplobacillus can be obtained from the heart-blood of the guinea-pigs, whether they have been infected by the inoculation of cultures or blood

from a human typhus patient. Moreover guinea-pigs that have been infected by injections of either cultures or typhus blood are immune against a second injection of either of them.

Cultures that have been heated for half an hour to 60° C., when injected into guinea-pigs, produce no infection; so there is every hope of being able to prepare a vaccine against this disease.

ii. The author remarks that in its early stages it is exceedingly difficult to differentiate between typhus and both typhoid fever and relapsing fever. Therefore, a more precise method of diagnosing the disease is much to be desired and the author believes that the examination of the blood will furnish the means.

In 1905 he examined the blood of 58 typhus patients. The films were stained intensely with Giemsa and in 40 of the cases peculiar very deeply stained leucocytes were observed. These leucocytes resemble lymphocytes and have a very basophile protoplasm and a round or oval nucleus situated excentrically; they are said to be identical with the so-called "Türkischen Reizformen" and often constitute 3-8 per cent. of the white cells.

The authors' conclusions are as follows:—

In the first days of the disease the number of leucocytes diminishes, then gradually rises until after the crisis after which, if there is no complication, the number gradually falls again to the normal; the reverse is the case with the red cells.

In the majority of typhus patients both in the earliest stages and also during the whole period of the disease, it is possible to detect the "Türkischen Reizformen" and these furnish a means of diagnosing the infection.

E. H.

MÜLLER (Paul Th.). **Vorlaüfige Mitteilung über bakteriologische Befunde bei Flecktyphus.** [Preliminary Note on the Bacteriology of Typhus.]—*München. Med. Wochenschr.* 1913. June 24. Vol. 60. No. 25. pp. 1364-1365.

The author has made bacteriological examinations of various cases of typhus occurring amongst the Bosnians in the Marine Hospital of San Bartolomeo, Trieste. In Giemsa-stained preparations, diplococci, diplobacilli, cocci and ovoid rod-shaped bodies, were found present in the blood of all the cases of typhus examined and also in four patients that no longer showed any fever. The cultural examination of the blood of eleven patients gave five positive results, in each case the development of diplobacilli in broth. Attempts to cultivate the organisms on ascitic agar succeeded only three times. The isolated cultures seem to be identical with those obtained by FUERTH from cases of typhus in Tsingtau. The organisms are non-motile rods which readily round off into coccoid forms in the various culture media. The pathogenicity of the cultured organism towards animals is only very slight. When mice were inoculated with enormous doses, they succumbed within twenty-four hours and the diplobacilli were found in every part of the body. A rabbit showed a single parasite after an incubation period of seven days. On the other hand three monkeys inoculated with the cultures remained quite normal.

According to the author there can be no doubt that this Diplobacillus isolated at San Bartolomeo is identical with the organism described by FUERTH, RABINOWITSCH (see this *Bulletin*, Vol. 1, p. 400), and also PREDTJETSCHENSKY. Further researches are in progress on its biological characters.

E. H.

MARKL. **Beitrag zur serologischen Diagnose des Flecktyphus.** [A Contribution to the Serum Diagnosis of Typhus.]—*Wien. Klin. Wochenschr.* 1913. July 24. Vol. 26. No. 30. pp. 1234-1235.

The author states that in spite of numerous researches the causative agent of typhus remains unknown.

With regard to the serum diagnosis NICOLLE and COMTE found that the serum of typhus patients agglutinated *Micrococcus melitensis* in dilutions of 1 in 50. The author attempted to confirm this observation but obtained uniformly negative results. The blood was obtained from ten patients between the third and ninth days of the fever, from four patients four to six days after convalescence had commenced, and finally from two post-mortems.

Both microscopic and bacteriological examinations gave entirely negative results. Moreover in spite of the statements of RICKETTS, NICOLLE, CONSEIL, KRUMWEIDE, PRATT and BULLOWA, regarding the susceptibility of monkeys and guinea-pigs, the author was unable to infect either of these animals by the intraperitoneal injection of defibrinated infected blood.

With regard to the deviation of the complement the author employed as antigen an alcoholic extract of the organs of a patient that had died of typhus eight years previously. Distinct, though slight, deviation of the complement was observed in the case of all patients infected with typhus from the third day of the fever up to four to six days afterwards. The author is therefore of the opinion that this reaction is of use for diagnostic purposes, as by means of it the disease can be recognised in its early stages.

[Markl's results should be compared with those of RABINOWITSCH (see this *Bulletin*, Vol. 1, pp. 400-401), who also obtained fixation of the complement in the serum of typhus patients when employing extracts of the organs of typhus cases as antigen].

E. H.

NEWMAN (H. H.). **A Sporadic Case of Typhus Fever.**—*Jl. Amer. Med. Assoc.* 1913. Nov. 1. Vol. 61. No. 18. pp. 1629-1630.

The author describes a typical case of typhus occurring in a twelve year old girl, who had lived on a farm in the District of Columbia. During the four months preceding the attack she had previously attended school at Baltimore.

The diagnosis of the disease was confirmed by various members of the Public Health Service including ANDERSON and GOLDBERGER and this case tends to confirm ANDERSON's view that unrecognised typhus is prevalent in various parts of America.

E. H.

HEAT STROKE.

FISKE (Charles N.). **The Effects of Exposure to Intense Heat on the Working Organism.**—*Amer. Jl. of the Med. Sciences.* 1913. Apr. Vol. 145. No. 4. (No. 493.) pp. 565-585.

In the period 1886-1910 there are recorded 1,507 cases of disability from the effects of heat in the returns of the Navy of the United States. The number of the personnel has increased from 9,191 in 1886, to 56,721 in 1910, but there have been 20 deaths only, and 33 invalids discharged from the Service on this account during the last 35 years. Sixty-four per cent. of the cases were "heat prostration," 34 per cent. were classified "thermic fever," and 4 per cent. "insolation." While the general admission rate for this cause was under 3 per 1,000 in 1909 and 1910, that of the stokers was about 8 per 1,000.

Abstracts of the Reports of many Naval Medical Officers are given, in which are described the conditions under which the Engineering Staff worked, conditions which appear to be incompatible with the support of human life. "The men of the engineer's force after four hours of severe and arduous toil in the frightful temperature of from 140° to 150° F. would come off watch and endeavour unsuccessfully to get rest and sleep in the comparatively less trying temperature of from 90° to 100°." "The ventilation of the engine room is very unsatisfactory and temperatures are recorded from 90° to 170° F."—"Steaming half-power the temperature of the starboard forward fire room reached 180° F. Three men were exhausted by the heat. On September 11, 190° F. was recorded. On the fireroom galleries the thermometer registered 205° F."—"The average temperatures of fireroom No. 1 for the year was 145·8° F. with a maximum of 204° F."—"these pump rooms registered 180° F."—"Temperatures as high as 183° F. in the fireroom are recorded, with 167° as the minimum."—"An occasional temperature of 210° F., reduced 30° by changing the location of the blowers."—"Steering engine room temperatures of a 110° to 115° and humidity so great that there is no evaporation from the body."

The favourable effects consequent on the substitution of oil for coal are thus commented on:—"The temperature in the fireroom rose to 140° F., which is about 10 higher than under previous conditions when burning coal. Nevertheless in this higher temperature no case of heat prostration occurred, nor during the cruise has any member of the engineer's force succumbed to heat. It is thought that the slight amount of physical exertion required to regulate the burners, as compared with passing coal, enables the fireroom watch to withstand a greater elevation of temperature. The number of men is reduced to about one half of those required for passing coal."

The chief symptoms noted in the men who were attacked are those of collapse: pallor or lividity, drenching perspirations, weakness of both voluntary and involuntary muscles, feebleness of the action of the heart and lungs, dizziness, headache, somnolence, and stupor, painful cramps of the muscles of the abdomen,

arms and legs; as a rule neither convulsions nor fever occur. Recovery is rapid. Among predisposing causes are chronic alcoholism, overcrowding, hard muscular work, fatigue, insufficient circulation of the air with a wet-bulb thermometer at 85° to 95° F., tight clothing, and not drinking a sufficiency of water.

Increased circulation of air, and asbestos sheathing of steam pipes are important preventive measures.

C. Birt.

HILLER (Arnold). **Wesen und Behandlung des Hitzschlags.** [Nature and Treatment of Heatstroke.]—*Deut. Med. Wochenschr.* 1913. June 19. Vol. 39. No. 25. pp. 1185-1188.

This is a continuation of the author's study of heatstroke in the German Army (see this *Bulletin,* Vol. 1, p. 583). As soon as the thermometer registers 30° C. in the shade, casualties arise. He states that during the heat of summer many people faint in the street, but they recover rapidly when they are removed to a shady place. A few days later however they may complain of paraesthesiae and loss of power in certain muscles. He attributes such symptoms, and also the heat exhaustion itself, to neurasthenia.

The effects of heat on the German troops during the summer manœuvres appear in four forms: 1, exhaustion on the march; 2, the asphyxial type of heatstroke; 3, the paralytic type, and 4, the psychopathic type.

Instances of the first form are always very numerous, but as soon as the soldier is relieved of his accoutrements and rests awhile, he recovers rapidly. The asphyxial type was noted in 329 out of 470 cases of heatstroke, the mortality of this form being 7 per cent. The soldier tries to fight against the increasing prostration which is coming over him, and marches on with tottering gait, fixed stare, and cyanosed face till he falls senseless to the ground. He is apparently dead for his respiration has stopped, his pulse is imperceptible, and he is deeply cyanosed. Artificial respiration is the only remedy and must be continued for two hours in some cases.

119 of the 470 cases of heatstroke were of the paralytic type; 60·5 per cent. of which were fatal. The chief symptoms are deep coma, convulsions which recur every few minutes, vomiting and diarrhoea, and hyperpyrexia. The body temperature must be reduced by cold effusions. Venesection is required to prevent the onset of oedema of the lungs and brain, for the former condition is found in 21 per cent. of autopsies, and the latter in 12 per cent.

22 of the 470 cases were of the psychopathic form, all of which recovered. The patient generally is confused or suffers from muttering delirum with hallucinations and fleeting delusions. Sometimes he is violent and excited, and imagines that he is surrounded with enemies from whom he seeks to escape by every means in his power. LAVERAN states there were 11 suicides among 200 cases of heatstroke in one brigade during operations in Oran, Algeria.

83·6 per cent. of the German soldiers who were prostrated by heat, were men out of condition by alcoholism, obesity, sedentary occupations, or chronic diseases of the heart or lungs; extensive adhesions of the lungs were found in 36 per cent. of 47 necropsies. According to ZUNTZ and SCHUMBURG 3 liters of water are lost by a man in the form of sweat during a four hour march, and with this about 20 grams of salts are excreted. If perspiration should be checked by want of water or other causes, the heat regulating mechanism of evaporation is impaired and the body temperature rises rapidly.

C. B.

PEMBREY (M. S.). **Heat-Stroke.**—*Jl. R. Army Med. Corps.* 1913. Aug. Vol. 21. No. 2. pp. 156-164.

This is an analysis of the reports of 50 cases of heatstroke which occurred among European troops in India between June, 1909, and September, 1910.

If the evaporation from the skin be sufficiently rapid, the human body can support temperatures above 100° C. for a few minutes. BLAGDEN and FORDYCE underwent exposure to a temperature of 115-126° C. in a dry atmosphere for 15 minutes without discomfort. But the body temperature rises, the pulse quickens, the perspiration is profuse, and dyspnoea and exhaustion come on when the wet bulb thermometer exceeds 88° to 90° F. (31° to 32° C.) if the air is motionless, even though the person be stripped and at rest. If muscular work is being performed, a wet bulb temperature of 80° F. (26·7° C.) causes distress. A movement in the air of two miles an hour permits a wet-bulb temperature of 93° F. (33·9° C.) to be borne. As the body temperature rises, the respiratory and nitrogenous exchanges are increased, hence in heatstroke there is not only a smaller loss but also a greater production of heat.

In 25 of the cases the wet-bulb temperature of the air was 80° F. (26·7° C.) or over; in 8 cases 84° F. (28·9° C.) or over, and in 5 cases 85° F. (29·4° C.) or over. The highest dry-bulb temperature was 112° F. (44·4° C.) with a wet-bulb temperature of 82° F. (27·8° C.). The highest record with the wet-bulb was 86° F. (30° C.) when the dry-bulb registered 108° F. (42·2° C.). The lowest temperature by the dry-bulb was 86° F. (30° C.), with the wet-bulb at 76° F. (24·4° C.); the lowest temperature by the wet-bulb was 67·8° F. (19·9° C.) with the dry-bulb at 94·8° F. (34·9° C.).

Muscular work entails increased combustion in the body, accompanied with greater production of heat. In the experimental marches at Aldershot the maximum rectal temperature observed was 102·4° F. (39·1° C.). The same march of 7 miles was performed by the same men on hot and cold days. On the first occasion the dry-bulb thermometer registered 79° F., and the wet-bulb 67·5° F.; on the second, 45° and 38° were the temperatures respectively. The maximum increase in the rectal temperature was 2·3° F. in the first march and only 1·6° F. in the second. On the hot day the maximum loss of water was

2,390 gms. of which 640 gms. were retained in the clothing; and on the cold day the maximum loss of water was 555 gms. only, 40 gms being taken up by the clothes. Hence the effect of work in a hot moist and still atmosphere is to increase the temperature, pulse and loss of moisture out of proportion to the work done. In 23 of the cases muscular work in the sun was noted as a factor in the causation of heatstroke.

Adjustment of the body to its rising temperature may be disturbed by unsuitable clothing and equipment and by debility from any cause. Alcohol upsets the heat regulation mechanism. The rectal temperature of men who have recovered from alcoholic poisoning has been noted as low as 75·2° F. (24° C.). When an alcoholic is exposed to heat his temperature rapidly ascends. Seven of the cases occurred in drinkers of which 4 were fatal; 7 in moderate drinkers, 2 ending fatally; and 7 in abstainers all of which ended in recovery except one. Malaria can act in a similar manner by lessening the power of accommodation of the body. The blood of 21 of the cases was examined for malarial parasites; they were found in 2. In 18 cases the patient had suffered from malaise for a few days before his seizure.

The mortality was 20 per cent. Twenty-seven of the men were between 20 and 25 years of age, but among them there were two deaths only. Of 10 men between the ages of 39 and 41 attacked, five succumbed. The average service in India of eight of the soldiers who died was four and a half years. Thirty of the cases occurred in Multan. The attack came on in the night in four instances only. Rogers in his analysis of 363 cases of heatstroke among British soldiers in India found that the time of onset was the hottest period of the day in the hottest months of the year in the large majority of instances.

There was one death in 22 cases in which the pyrexia did not exceed 107° F. (41·7° C.); and 10 out of 12 men recovered whose temperature had mounted to 107°-108° F. Five out of six survived temperatures of 108°-109° F.; and 3 out of 5, 109°-110° F. Four men with temperatures 110°-111° F. succumbed.

Absence of sweating was a symptom in several cases. The application of cold douche and enema gave good results; antipyretic drugs were useless.

Heart disease was found on post-mortem examination in one case, and cirrhosis of the liver in another.

There is no bacteriological, experimental or clinical evidence that heatstroke is a specific fever as some writers have suggested.

C. B.

Ross (T. S.). **Heat-Stroke.** [Correspondence.]—*Indian Med. Gaz.* 1913. Sept. Vol. 48. No. 9. p. 372.

Cases of cerebral malaria are frequent in which the symptoms simulate heatstroke. Two Indian soldiers dropped down senseless while marching on a very hot day; malarial parasites were present in the blood of both. One died in a short time; the other recovered without any treatment except intramuscular injections of quinine. An Indian boy lay unconscious for two days with a

temperature of 106° F.; he was restored to health by the intramuscular injection of quinine. The author has met with 6 similar examples of cerebral malaria. He states that he himself has not seen a case of heatstroke. [Being an officer of the Indian Medical Service employed as Medical Officer of Health for 8 years he would not be called upon to treat many Europeans.] He says however, "I have known cases of apoplexy occurring in typically apoplectic subjects in whom the attack was immediately determined by exposure to a high temperature in a stuffy room, or railway station or railway carriage."

C. B.

NEILSON (J. L.). **Two Cases of Thermic Fever occurring in the Fireroom of a Battleship.**—*U.S. Naval Med. Bull.* 1913. Oct. Vol. 7. No. 4. pp. 579-583.

It was reported in the daily press that in August of this year several deaths from heatstroke had occurred in the fireroom staffs of trans-Atlantic liners. The U.S.S. "Illinois," a training ship for midshipmen, was cruising near Madeira when the average temperature for 11 days was 86° F. with a high humidity. On August 9 when the temperature was 85° F. a midshipman had acted as coal passer for an hour, and had been for nearly an hour in the boiler room where the temperature was 138° F. and the ventilation defective, when he suddenly collapsed: he was unconscious, cyanosed, and pulseless; his respirations soon ceased, convulsions came on, his skin was dry, the rectal temperature was 107°·5 F. Under artificial respiration continued for about a minute, he revived, his pulse was then 130 a minute. He remained comatose for 20 minutes, and was irritable and restless for several hours. No urine was passed until the following morning; it contained a trace of albumen. Recovery was rapid.

On the same day another midshipman was employed in a fireroom the temperature of which was 128° F., when he felt giddy and unable to concentrate his thoughts, or to speak clearly, or to hear distinctly. He became excited and violent for a few moments and then fell senseless. Severe convulsions ending in deep coma ensued; his pupils were contracted to pin points, his eyelids twitched; his breathing was shallow and his pulse was weak and 160 a minute; his rectal temperature was 107° F. He remained unconscious for 4 hours, and for the remainder of the night he resented being disturbed and complained of headache. On the next day his urine was faintly albuminous, his temperature was nearly 100° F. and he was somnolent. Not till two days later did his temperature fall to normal limits, but his convalescence afterwards was speedy. In both the treatment consisted in the application of ice to the head and body, and the administration of iced water enemata. Venesection to the extent of 6 ounces was employed in the second case followed by the hypodermic injection of saline fluid.

C. B.

Annual Report of the Sanitary Commissioner with the Government of India for 1911.—1913. Calcutta: Superintendent Government Printing, India. [Heatstroke. pp. 12 & 76.]

In the year 1911 there were 254 cases of heatstroke, 24 of which ended fatally, among the European troops in India; 13 officers, 6 women and 13 children were also attacked, but without a fatal issue in any of them. In the Indian regiments there were only 11 cases and no deaths. In the jail population of India there were 127 cases and 34 deaths. The highest incidence in the Europeans occurred at Agra where 31·8 per thousand of strength were admitted during the year; Poonamallee came next with 18·7 per thousand; there were three deaths from this cause at Ferozepore. Fatehgarh, Benares, Jubbulpore, Jhansi, Nowshera, and Sialkot were other stations in which the incidence was high. Only 10 per thousand of troops on the march were seized; this is a considerably lower ratio than was noted in any of the above-mentioned places.

C. B.

MOSQUITOES AND THEIR DESTRUCTION.

STANTON (A. T.). **The Anopheles of Malaya. Part 1.**—*Bull. Entomol. Research.* 1913. Sept. Vol. 4. Pt. 2. pp. 129-133. With 4 text-figs.

This is the first of a series of papers in which the author proposes to give the results of a detailed study of the individual species of the Malayan Anopheles. He lays stress on the necessity of including descriptions both of immature and mature larvae in view of the growth changes which these forms undergo. The leaflets in all the palmate hairs of a given larva are not of similar form and it is necessary in all cases to indicate the segment which bears them. Palmate hairs borne on the thorax usually differ in shape from those springing from abdominal segments. The author states:—

"The synonymy suggested for the different species is based on the study of a series of specimens, derived in most cases from a single female of the species and on careful comparison of these specimens with published descriptions. It has not been possible to examine all the original types, some of which are now non-existent and others inaccessible to the writer; it is possible therefore that this synonymy may require revision at the hands of those who have opportunity for this investigation and who are also familiar with the common variations in the species itself.

"There is no doubt that in this group of insects the number of species names has been unnecessarily increased by authors attaching exaggerated importance to characters which on further study have proved to be variable, and that the natural affinities of species have been obscured by the division of the group into a multiplicity of genera."

The author discusses the question of synonyms and points out why errors have occurred. He then describes the ovum, immature and mature larva, and the pupa. Illustrations by R. W. BLAIR aid the text.

It is to be noted that among Malayan species the mature larva of *Anopheles tessellatus* most nearly resembles that of *Anopheles kochi*.

A. Balfour.

STRICKLAND (C.). **The Myzorhynchus Group of Anopheline Mosquitos in Malaya.**—*Bull. Entomol. Research.* 1913. Sept. Vol. 4. Pt. 2. pp. 135-142.

The title of the paper sufficiently indicates the scope of the work undertaken and the author summarises his results as follows:—

(1) The species *sinensis, barbirostris, umbrosus, albotaeniatus, asiatica* have been considered valid.

(2) The species *vanus, annularis, minutus, paeditaeniatus* and *separatus* have been rejected as invalid.

(3) Certain new characters of the valid species have been noticed.

(4) The descriptions of the species have been revised.

(5) The genus *Patagiamyia* has been rejected, as also the genus *Lophoscelomyia,* both having been included in the genus *Myzorhynchus.*

(6) It is suggested that the *Myzorhynchus* group forms a series sufficiently distinct from other Anophelines to make it advisable to give it a separate generic title.

In a postscript he states that he goes further than STANTON, who has been unable to satisfy himself that *separatus* is distinct from *sinensis.* Strickland thinks that he has advanced sufficient evidence to prove them identical. STANTON retains *albotaeniatus* but only pending the examination of more material. As noted above Strickland regards it as certainly a distinct species. STANTON groups all the species under Anopheles but Strickland considers the group so well defined from other Anophelines that he feels justified in naming it as a distinct genus. For the new characters of the valid species and the revised description the original paper must be consulted.

A. B.

BUTTRICK (P. L.). **The Effect of Tides and Rainfall on the Breeding of Salt Marsh Mosquitoes.**—*Jl. Economic Entomology.* 1913. Aug. Vol. 6. No. 4. pp. 352-359.

New Haven, Connecticut, has for many years had a mosquito reputation in the summer only second to that of certain places in New Jersey. The chief culprit is the banded salt marsh mosquito (*Culex sollicitans,* Walk.). Its eggs are laid singly on the salt marsh mud and lie dormant until covered by water, either tide or rain. They then hatch in a few hours; and in from six to fifteen days, according to the temperature, the adults emerge from the pupae. These migrate or are wind blown into inhabited places where they render life miserable. Some return to the marsh or its vicinity and start the next generation.

The paper is chiefly concerned with the question of tides, their effect on the breeding habits of this mosquito, and the methods of studying them so that an oiling campaign can be conducted to the best advantage. Calculations regarding the tides are based upon the so-called "prediction" tables of the United States Coast and Geodetic Survey which are highly accurate, as is shown by means of a chart giving the actual tides and the predictions in the form of curves. The paper, though useful, is chiefly of local interest. When considering the influence of rainfall the author states that though it is a factor in the abundance of mosquitoes it does not necessarily follow that the more rain the more mosquitoes. The time and size of individual rains are, however, of great importance

in the case of *C. sollicitans* and at times rain may actually prevent breeding by causing a premature hatching of eggs when there is not enough water present for full development to take place.

A. B.

BRITTON (W. E.). **Mosquito Control Work in Connecticut in 1912.** [With Discussion.] — *Jl. Economic Entomology.* 1913. Feb. Vol. 6. No. 1. pp. 89-93.

Although a complete survey of the shore region of Connecticut was made by the author's assistants in 1904 and maps and recommendations furnished each town, it was not until 1911 that anything was done. Then one community took the initiative and soon "mosquito weeks" and "donation weeks" were rife. However, despite every effort in the way of lectures and demonstrations only 5,000 dollars of the 25,000 required were forthcoming. This money was spent on draining and oiling round New Haven and, so far as the work went, the result was satisfactory. A table is given showing the cost of draining parts of the salt marshes but it scarcely merits reproduction. Kerosene and light fuel oil known as "34° distillate" were used for the petrolage. The latter, though somewhat the cheaper, proved more injurious to vegetation and to the various forms of aquatic animal life—some of which destroy mosquito larvae. It was found best to employ the large "Double Forester" pumps, made by W. B. DOUGLAS, Middletown, Connecticut, for fighting forest fires.

The author thinks the problem of salt marsh drainage and oiling is too large for communities to solve separately. The movement must be state-wide. In a discussion on the paper it was stated that the campaign at Worcester, Mass., had been highly successful, malaria which had been gaining ground having been almost entirely banished.

A. B.

SEWELL (R. B. S.) & CHAUDHURI (B. L.). **Indian Fish of Proved Utility as Mosquito-Destroyers.** 1912. 25 pp. With 9 text-figs. Calcutta: Sold by the Superintendent, Indian Museum. [Price 8 annas.]

The authors have compiled a useful and well illustrated pamphlet describing those genera and species of fish which in India are most likely to be of use as destroyers of mosquito larvae. It is specially intended to stimulate interest in the subject and to indicate the proper lines which such research should follow. They have found fish belonging to eight different genera to be of considerable service. In some cases, as in the genus *Haplochilus*, all the species are of equal utility; in others, however, for example *Barbus*, certain species, *i.e.*, those which as adults do not attain a large size, are of much greater use than others. Some of the fish by reason of their shape, *e.g.*, the flat-headed *Haplochilus*, are well suited for surface feeding in shallows, others like those belonging to the genera *Ambassis* and *Trichogaster* are compressed from side to side and deep from above downwards, thus being better adapted for somewhat deeper waters. The short notes attached to

A.

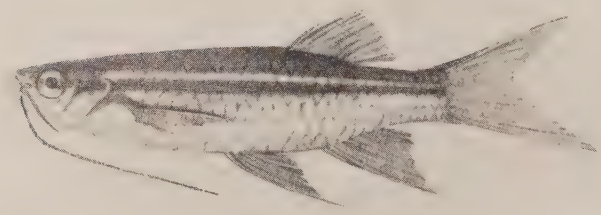
B.

C.

A. *Haplochilus panchax* (nat. size).
B. *Ambassis ranga* (nat. size).
C. *Trichogaster fasciatus* (nat. size).

D

E.



F.

D. (♂) and E. (♀). *Lebias dispar* (nat. size).
F. *Nuria danrica* (nat. size).

some of the descriptions are interesting and in addition to the fish specially mentioned a list of others of minor importance is given. It is worth noting that the value of the *Chilwa* (*Chela agentea*) as a mosquito eater has been exaggerated. Indeed it is stated not to be a surface feeder. [This is important as the *Chilwa* has been credited with "rising to the fly," and taking female mosquitoes intent on ovipositing.]

The appendix by Captain SEWELL contains general observations on pisciculture and special notes on the habits of small Indian fish. It would appear that the species most useful in mosquito reduction belong to the genera *Haplochilus*, *Ambassis*, *Trichogaster* and *Nuria*. Sewell concludes with a reference to the advantages and disadvantages of water-weeds as regards their influence on mosquito life.

[This paper will appeal to many elsewhere than in India as several of the genera mentioned are represented in other parts of the world. As the authors state a member of the genus *Labias* = *L.* or *Cyprinodon dispar* has been tested in the Anglo-Egyptian Sudan and found efficient as a larva eater, but unfortunately it proved rather difficult to transport and rear in captivity. At the present time experiments are being carried out in Khartoum with some species of *Haplochilus* obtained from Lake No on the Upper Nile. In arranging for this work the paper under review was found of value; hence it has been considered advisable to reproduce several of the illustrations.]

A. B.

GRAHAM (J. D.). **Note on Mosquito Larvae-Destroying Fish in the United Provinces.** 6 pp. folio. [1913.] Printed by F. Luker, Supdt. Govt. Press.

Major Graham has carried out a useful fish survey in certain districts of the United Provinces in India. He agrees with SEWELL that a survey of indigenous fish is of the first importance with a view to making use of any such as are available and of eradicating from tanks any highly carnivorous species as, for example, the full-grown *Aphiocephalus*. The most useful larvivorous fish found in the United Provinces seemed to be *Trichogaster fasciatus* (popular name Khasri) and *T. labius* (Bhuri), *Ambassis ranga* (Channa) and *Nuria danrica*. A variety of the last named was discovered and has been named *grahami*. Experiments were made with a considerable number of species, care being taken to reproduce natural conditions as far as possible and not to starve the fish prior to the tests. Haplochilus and some well-known species were not found but they probably exist somewhere in the United Provinces. There is an interesting note on the introduction of the Barbados "millions" into India. They have been studied there by the fish department of the Indian Museum and it is stated that they reproduce slowly, are inferior to Haplochilus as larvae-eaters, are more omnivorous and less hardy. The paper concludes with a long list of fish found in various districts of the United Provinces.

A. B.

FRIEDRICHS (K.). **Exotische und einheimische Fischarten als Vertilger der Stechmückenlarven.** [Foreign and Native Mosquito-destroying Fish.] — *Fischerei-Zeitung.* 1912. June 16. Vol. 15. No. 24. 6 pp.

The greater part of this paper is a review of the work of those who have made observations on mosquito-killing fish. Special attention is paid to a paper by NICHOLLS on the "Millions," *Girardinus poeciloides* of St. Lucia, West Indies, and to that of GRAHAM on *Haplochilus grahami* found in swamps at Lagos. This little fish belongs to the Cyprinodonts, a family which also includes the Barrigudo of Brazil (possibly *Girardinus caudimaculatus*) and other well known genera and species, for example the "Killifish" of North America (genus *Fundulus*), and the "Top Minnow," *Gambusia affinis.* The work of BENTLEY in India which deals principally with the value of *Haplochilus lineatus*, the "Piku" fish or so-called "Scooty" and of a species of *Anabas* known as "Kazari" or "Kasara" receives due notice, as does that of KING in the Anglo-Egyptian Sudan on *Ophiocephalus obscurus* and *Lebias* (*Cyprinodon*) *dispar.* Special attention is paid to the valuable investigations of SMITH* in the United States and there is also a short description of the characteristics of the Cyprinodonts.

The author has some notes on the European sticklebacks and refers to the use of fish of economic value as larvae-eaters. In this connection he mentions the pisciculture at present practised in the rice fields of North Italy (see this *Bulletin*, Vol. 2, pp. 329-330) and points out that ducks, like fish, keep pools and ponds free from mosquito larvae. He has also something to say about eels which, although perhaps not so valuable for mosquito destruction as some other fish, are useful in certain places owing to their migratory habits, *e.g.*, in swampy parts where shallow pools tend to dry up. Eels leave such pools and seek other water collections, a habit which they share in common with the above-mentioned *Haplochilus grahami.* They can also live in the brackish water so often found in the neighbourhood of seaside watering places. The paper though it contains little original matter is a useful resumé, and concludes with a classification of the different genera mentioned, the table being compiled from the works of BOULENGER and GARMAN.

A. B.

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* SMITH (J. B.). Report of the New Jersey State Agricult. Exper. Station upon the Mosquitoes occurring within the State, their Habits, Life History, etc. —1904. Fisb versus Mosquito Larvae. pp. 92–113.

Book Review.

Graham-Smith (G. S.). **Flies in Relation to Disease. Non-blood-sucking Flies.**—xiv. + 292 pp. With 24 plates and 32 text-figs. [Vol. 1 of the Cambridge Public Health Series.] 1913. Cambridge: at the University Press. [10*s*. 6*d*. net.]

The particular merit of this useful book is that it gives, among other things, a very full and exact account of the evidence, experimental and other, upon which the general suspicion of the house-fly as an agent in the transmission of specific pathogenic organisms is justified. Entomologists for the most part have been content to hold the insect up to execration as obviously and irretrievably impure of life, but here are to be found those facts, duly marshalled and submitted to careful bacteriological scrutiny—and those measured and qualified inferences from the facts—without which the vehement denunciations of the entomologist must be open to reactionary criticism.

As one of the declared objects of the book is to assist those who may have to formulate plans of research, the chapter on the ways whereby house-flies carry and distribute *Bacillus prodigiosus* must be singled out as a model example of the methods by which the great fly-problem, in all its specific ramifications, is to be attacked. In this "standard" chapter the author describes in great detail a series of experiments devised to determine the persistence of the bacillus on and in the fly, the possibility of germination in the fly's crop, the length of time that infective faeces, etc., are deposited by the fly, the influence of different kinds of food on the infectivity of the faeces, the manner and measure of infection of different media by infective flies, and the possibility of infecting clean flies from the excreta of those already contaminated. Other necessary aspects of the problem are focussed, with a precision that will greatly facilitate the labours of future investigators, in the chapter on the fate of micro-organisms ingested by the larva; in the chapter on anthrax, in which experiments to determine the exact resistance of *spores*, both in the adult fly and in the larva, and also in the dead fly, are described; and in the chapter on epidemic diarrhoea, in which the bearings of epidemiological evidence are carefully checked. In this connexion also the short chapter on the methods of keeping flies under observation in captivity may be of some use. The author also does good service in pointing out all the qualifications that have to be made in the application of inferences drawn from experimental manipulations of captive flies and cultures, to the doings of free flies in an ordinary environment.

In dealing historically with flies as disseminators of specific *noxae*, the author sets out to review, as far as possible, the potentialities of the insect as defined by experiment; the equipoise between the appearance of the insect and the out-break of the particular disease, as revealed by statistics; and the evidence of the existence of the specific *noxa* in free flies. The diseases severally reviewed are typhoid, dysentery, paratyphoid, epidemic diarrhoea, cholera, tuberculosis, anthrax, diphtheria, ophthalmia, plague, staphylococcal infection, poliomyelitis, small-pox, tropical sore, trypanosomiasis, yaws, and parasitic-worm-infections. Naturally there must here be great inequality of historic treatment; but in the short section on bacillary dysentery it is surprising to find the admirable work done by P. H. Bahr in Fiji completely overlooked.

The entomology of the house-fly—its structure, life-history, habits, etc., and the external features that distinguish it from other species of flies commonly found in houses—is considered in much detail; but as this part of the book, though of great general interest, has no special connexion with problems peculiar to tropical medicine, it hardly comes within the scope of this journal. The same remarks apply to the chapters on the diseases of flies, and the prevention and control of house-flies.

The short section on Myiasis is below the critical standard of the rest of the book: the very interesting observations and experiments of Roubaud on *Auchmeromyia* and *Cordylobia* are not recorded, and *Bengalia depressa* receives an undue share of consideration.

The bibliography is copious and without doubt will be extremely useful: personally I feel the greatest admiration for Dr. Graham-Smith's courage in undertaking it. But why, since Government Reports are included in it, is there no mention of those of Colonel H. B. THORNHILL of the Indian Staff Corps—an enlightened officer who, as a cantonment magistrate in Bengal, started a thoroughly scientific campaign against the house-fly more than twenty years ago?

There is an omission in the first line of the Preface that will never please, particularly as the whole paragraph has little pertinence to a book on flies that do not suck blood. Had Dr. Graham-Smith not read a paper* in Vol. XIV., 1879, of the Journal of the Linnean Society, Zoology, when he wrote this paragraph?

A. Alcock.

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* MANSON (Patrick). On the Development of *Filaria sanguinis hominis*, and on the Mosquito considered as a Nurse. *Jl. Linnean Soc.*, Zoology. 1879. Vol. 14. pp. 304–311.—Ed.

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United States Naval Medical Bulletin. 1907, April, Vol. 1, No. 1; 1908, Jan., Vol. 2, No. 1; and 1911, April, Vol. 5, No. 2.

CONTENTS.

BERIBERI.

Page.

EIJKMAN ; NOCHT : Etiology and Prophylaxis ... 595–596
CASPARI & MOSZKOWSKI : Toxic Origin of Beriberi ... 597
HOPKINS : Diseases due to Deficiencies in Diet 598
CHAMBERLAIN : Rice and its Milling 598
JENNISSEN : Beriberi at Billiton, Dutch East Indies ... 599
HEISER : Beriberi in the Philippines 600
FRASER & STANTON ; GIMLETTE ; STANLEY ; CASEY : Etiology of Beriberi 601–602
VEDDER & WILLIAMS ; FUNK : Vitamines ... 602–605
WISE & MINETT ; LOVELACE : Epidemic Dropsy and Peripheral Neuritis in South America ... 606–607
KARIYA & TSUJUKI : Blood Pressure in Beriberi ... 607
WELLMAN & BASS ; WELLMAN : Polyneuritis gallinarum 608
VOEGTLIN & TOWLES : Treatment of Polyneuritis gallinarum by Extracts of Spinal Cord 609
WELLMAN, EUSTIS & SCOTT : Cure of Polyneuritis gallinarum by Injection of Extracts of Rice Polishings ... 609
YAMAGIWA, KOYANO, MIDORIGAWA & MOGI : Experiments on the Cause and Nature of Beriberi 610

PAPPATACI FEVER.

BELLILE : Pappataci Fever in Crete 611
ANNUAL REPORTS : Pappataci Fever in India 611
LOUGHNAN : Pappataci Fever in Aden 613
BIRT : Phlebotomus Fever and Dengue 614
KING ; HOWLETT : Bionomics of Phlebotomus ... 614–615
WENYON : How to keep Phlebotomus alive in Captivity 616

DENGUE AND UNCLASSED FEVERS.

ROUCHÉ : Dengue on Board Ship 616
KHAN : Dengue at Meerut 617
ASIATIC SOCIETY : Dengue or Seven Day Fever ... 617
LALOR : Seven Day Fever 618
ELLIOTT : Six Day Fever 618
GABBI : Unclassified Fevers in Tripoli 618

VERRUGA PERUVIANA.

STRONG, TYZZER, BRUES, SELLARDS & GASTIABURU ; DARLING : Verruga and Oroya Fever ... 619–620
TOWNSEND : Transmission Experiments in Verruga ... 620
DA ROCHA-LIMA : The Histology of Verruga 621

HELMINTHIASIS.

AMERICAN SOCIETY OF TROPICAL MEDICINE : On the Comparative Importance of Intestinal Parasites ... 623
LEIPER : Observations on Certain Helminths of Man (figures) 624
LEIPER : Seven Helminthological Notes 626
KAY ; LEIPER : A Comment on Two Recent Articles on Helminth Infections 627
CROWELL & HAMMACK : Intestinal Parasites in the Philippines 627

HELMINTHIASIS—*continued.*

Page.
JOHNSTON : Intestinal Parasites in Northern Nigeria ... 628
BOURRET : „ „ in Senegal 629
HARRISON : The Prognosis in Bilharziasis 630
EDGAR : Yangtse Fever 630
DÉVÉ : Experimental Production of Echinococcus Cysts 631
LEIPER : *Agchylostoma Ceylanicum* and *A. Braziliense* (figures) 632
MOORE : Remarkable Emaciation in Hookworm Disease 633
KEITH : Treatment of Ankylostomiasis 633
YOSHIDA : Haemolysis and Thymol 634
GIUDICE : Appendicitis and Ankylostomes 634
LE ROY DES BARRES : Hepatic Ascaridiasis 635
ROW : Round Worms and the Puerperium 635
GALLET DE SANTERRE : Dysentery and Ascarides ... 636
LISTON : Investigations into Guinea-Worm Disease ... 636
O'DONOGHUE : A Case of Guinea-Worm 637
SMITH & DENNEY : *Agamomermis Restiformis* from the Human Urethra (figures) 637
MCNEIL : Method of Extracting Ova from Stools ... 638
MANCEAUX : Erythrocyte-Consuming Eosinophiles ... 638

TYPHUS.

ANDERSON : Typhus in the United States 639
HEGLER & VON PROWAZEK : Observations on Typhus at Belgrade 639
ARZT & KERL : Typhus amongst the Bosnians 641
LÉVÊQUE : Tkout Fever 641
KULKA : 642
RABINOWITSCH ; MÜLLER : Bacteriology of Typhus 642–643
MARKL : Serum Diagnosis of Typhus 644
NEWMAN : A Sporadic Case of Typhus 644

HEAT STROKE.

FISKE ; HILLER ; PEMBREY ; ROSS ; NEILSON ; ANNUAL REPORT OF SANITARY COMMISSIONER IN INDIA 645–650

MOSQUITOES AND THEIR DESTRUCTION.

STANTON ; STRICKLAND : Anopheline Mosquitoes in Malaya 650–651
BUTTRICK ; BRITTON : Control of Salt Marsh Mosquitoes 651–652
SEWELL & CHAUDHURI ; GRAHAM ; FRIEDRICHS : Fish as Mosquito Destroyers. (Two Plates) ... 652–654

BOOK REVIEW.

GRAHAM-SMITH : Non-Bloodsucking Flies in Relation to Disease 655

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